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THE USE OF LANDSAT IMAGERY IN RELATION TO AIR SURVEY IMAGERY
FOR
TERRAIN ANALYSIS IN NORTHWEST QUEENSLAND, AUSTRALIA

ERTS FOLLOW-ON PROGRAMME STUDY N° 2692B (29650)

FINAL REPORT

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by

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Volume II

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**ORIGINAL CONTAINS
COLOR ILLUSTRATIONS**

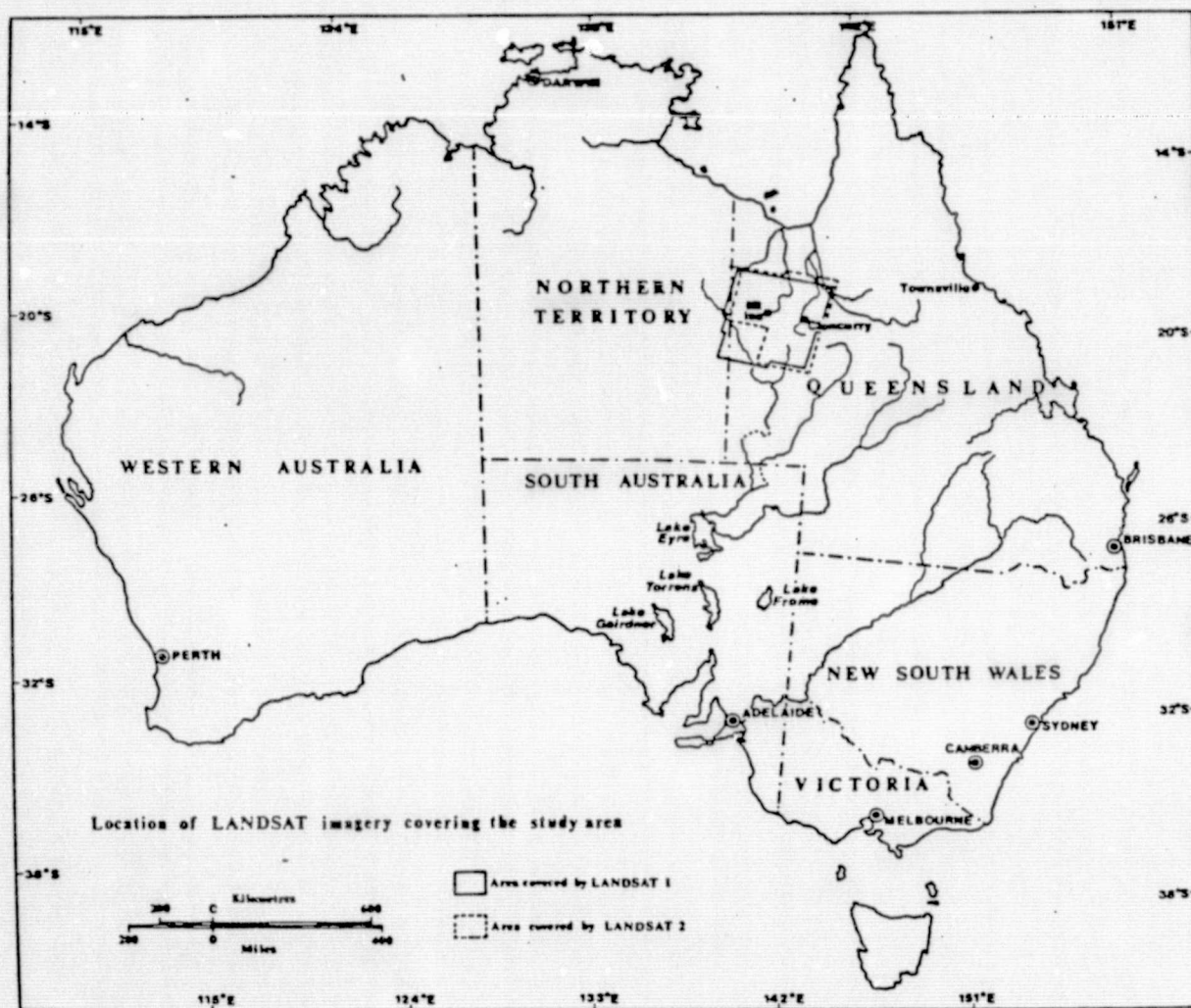


Figure 1 Location of study area covered by LANDSAT 1 and LANDSAT 2 imagery.

Gregory River-Mount Isa
Frame 1207-00133
15-2-1973

Cloncurry-Dobbyn
Frame 1152-00073
22-12-1972

Mount Isa -
Urandangi
Frame 1027-00123
19-8-1972

Georgina River
Frame 1189-00133
28-1-1973

Cloncurry-Duchess
Frame 1206-00081
14-2-1973

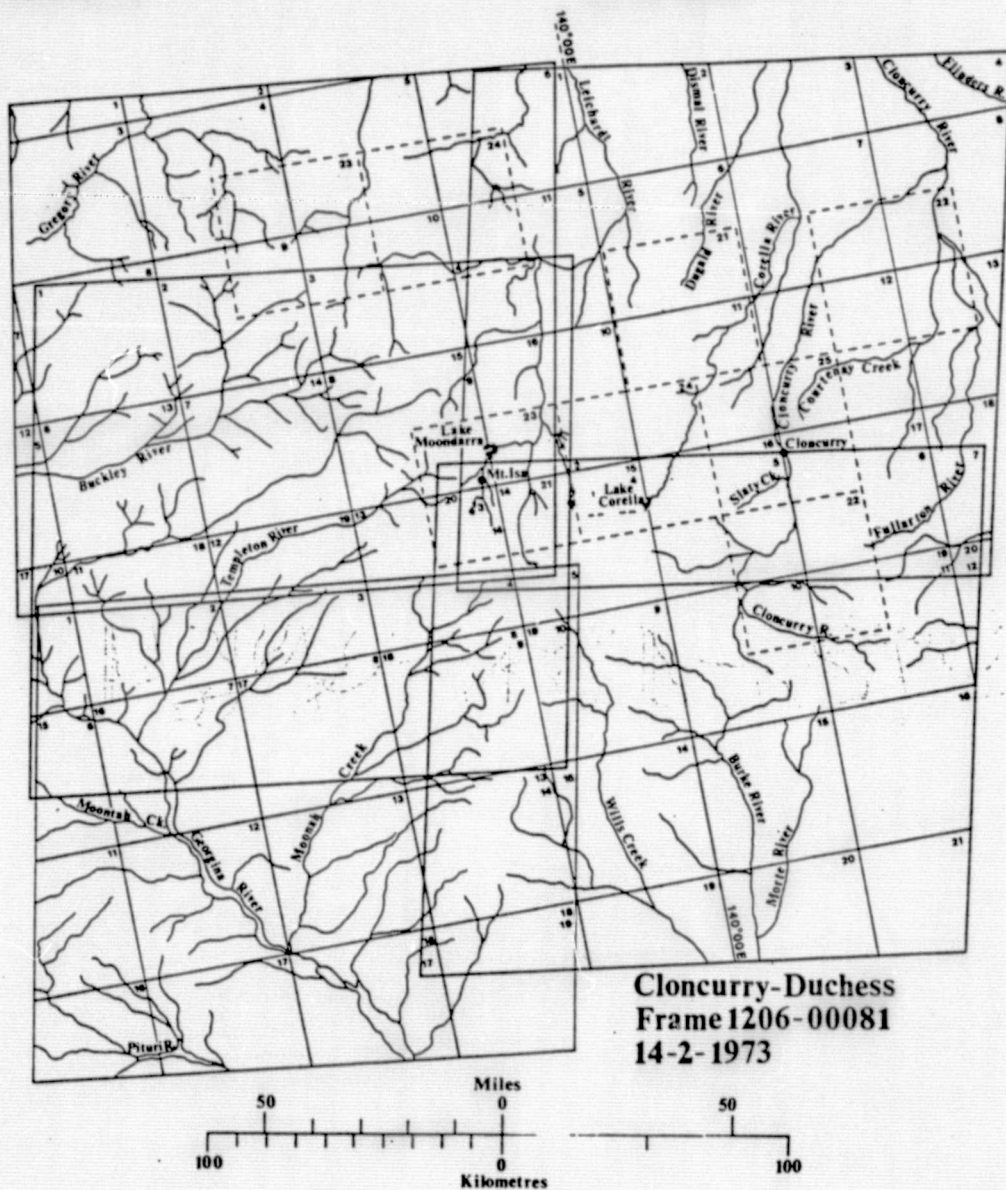
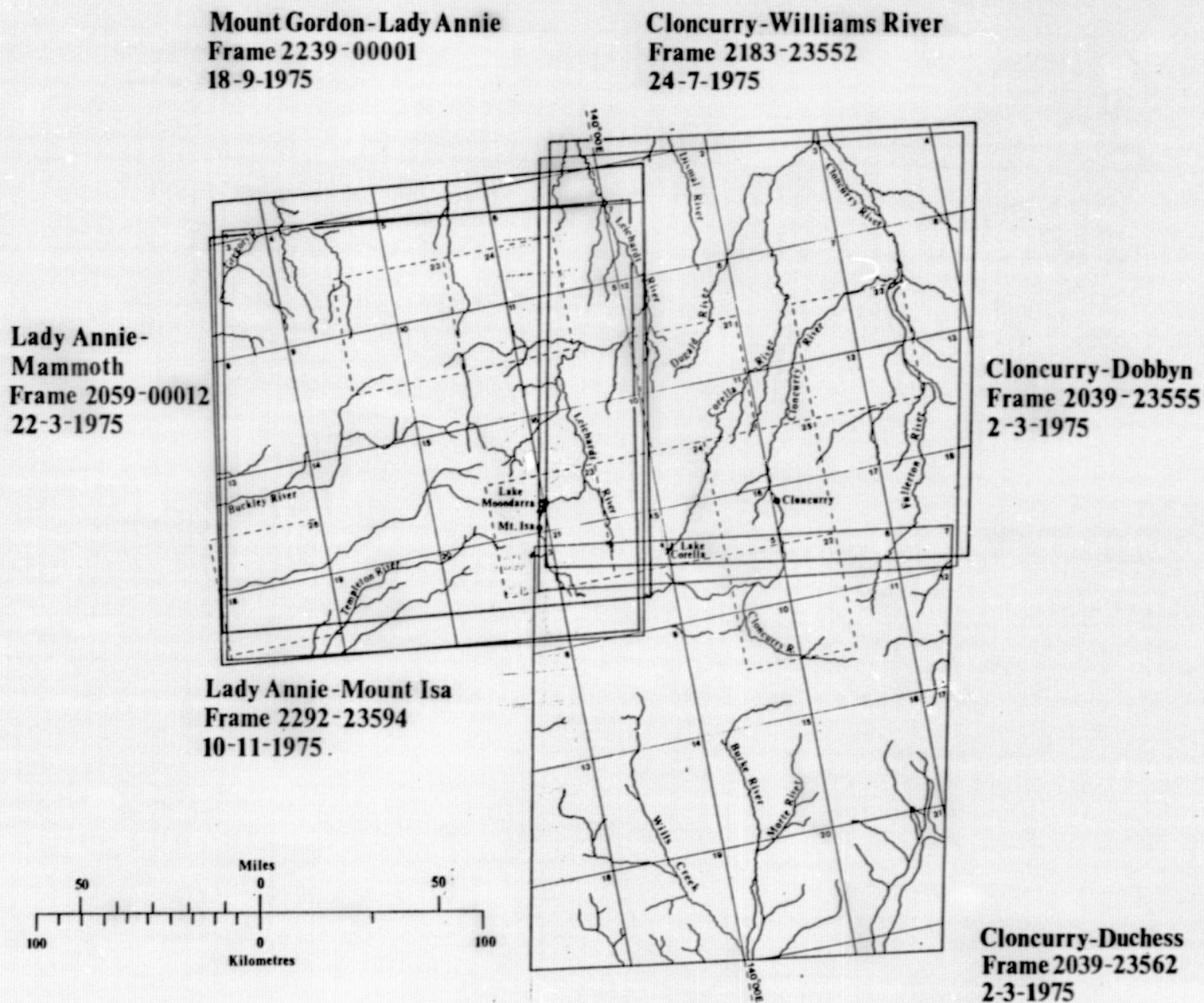
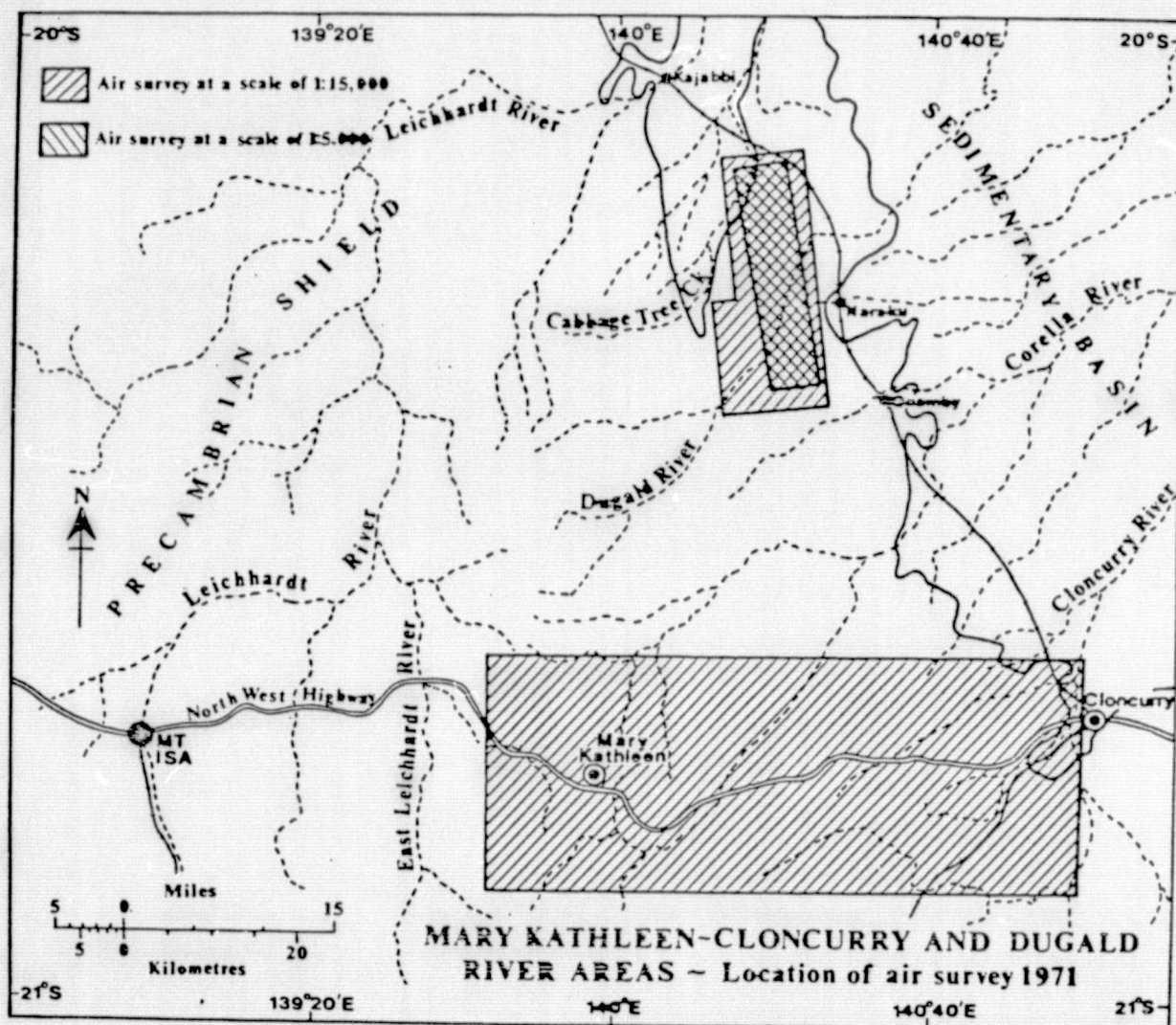


Figure 2 Areas of northwest Queensland covered by LANDSAT 1 imagery

Figure 3 Areas of northwest Queensland covered by LANDSAT 2 imagery





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Figure 4 Mary Kathleen - Cloncurry and Dugald River Areas.
Location of air surveys 1971

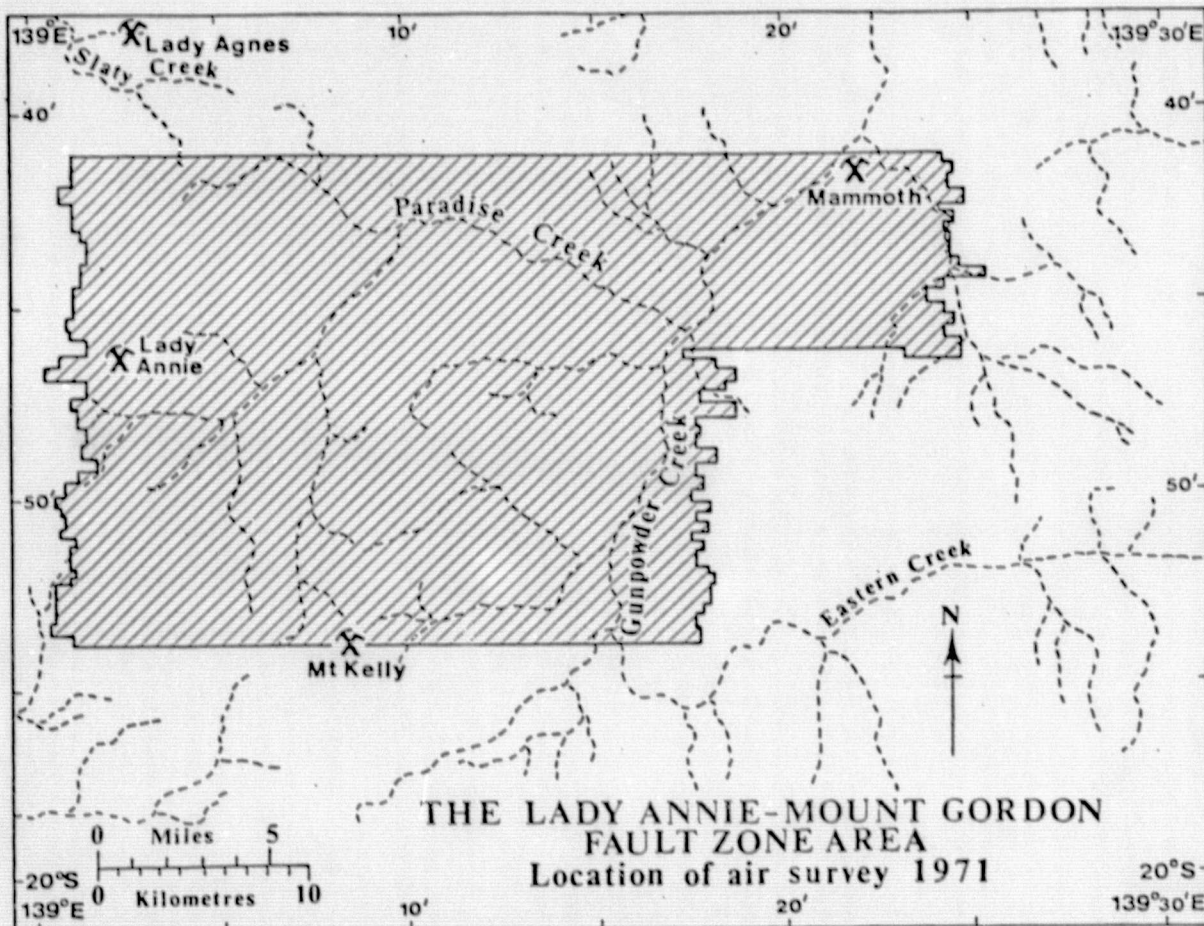


Figure 5 Lady Annie - Mount Gordon Fault Zone Area. Location of air survey 1971

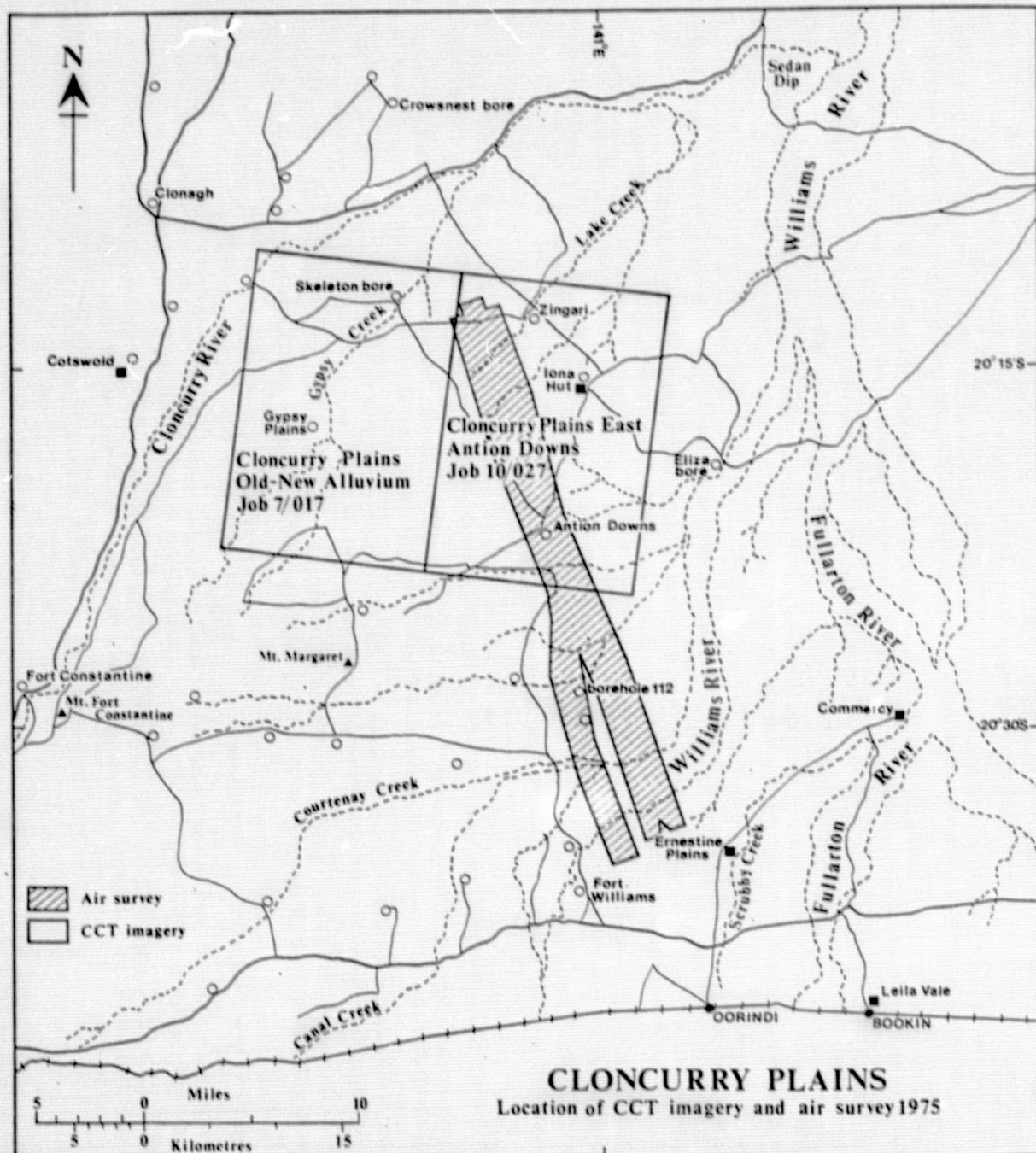
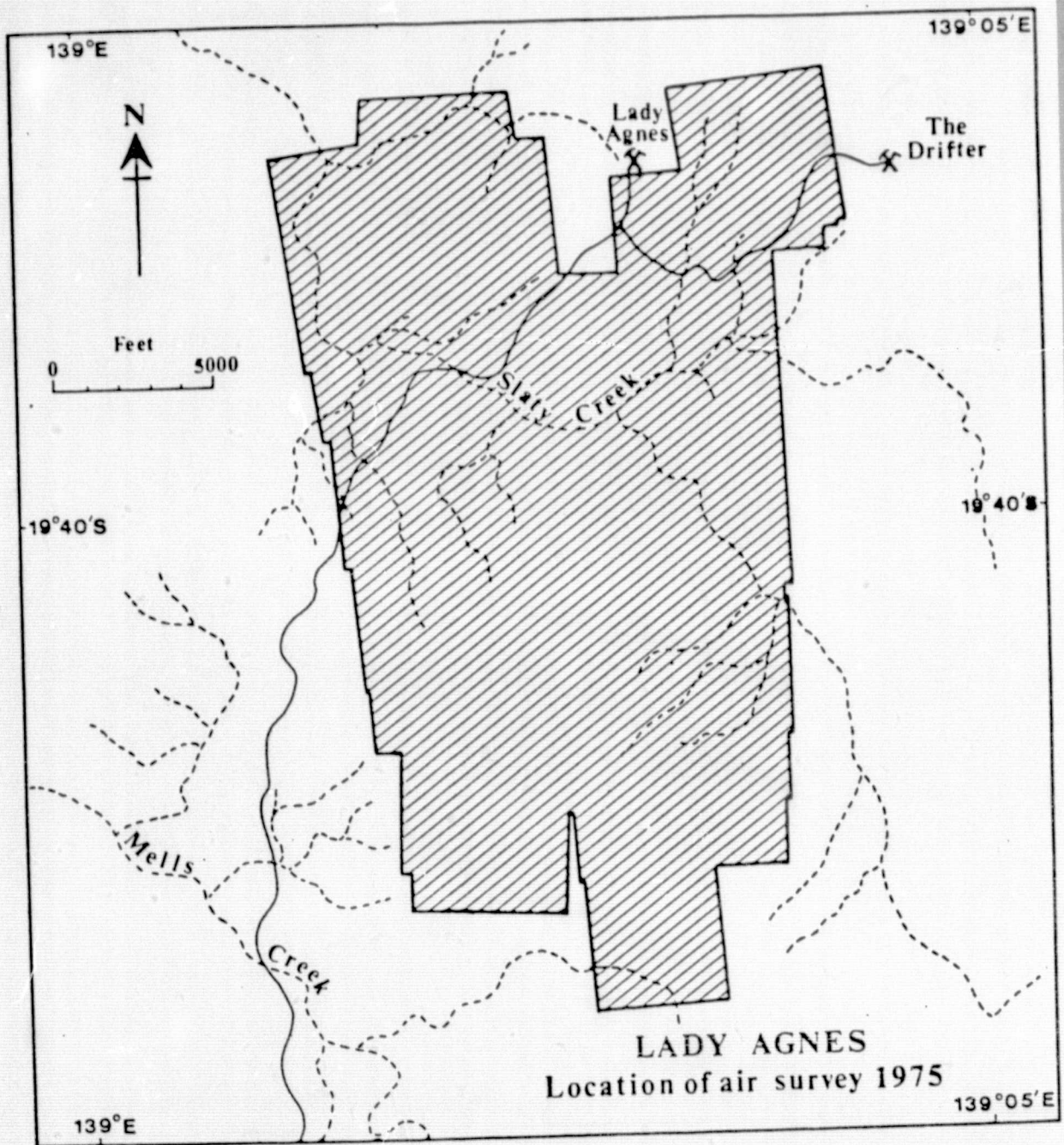


Figure 6

Cloncurry Plains. Location of air survey 1975 and of colour composites generated from CCT for 2 March 1975.



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Figure 7 Lady Agnes area. Location of air survey 1975

KEY TO MULTISPECTRAL SIGNATURE CODES

TONE

1
 2
 3
 4
 5
 6
 7
 8
 9

↓
 Tones of
 increasing
 density

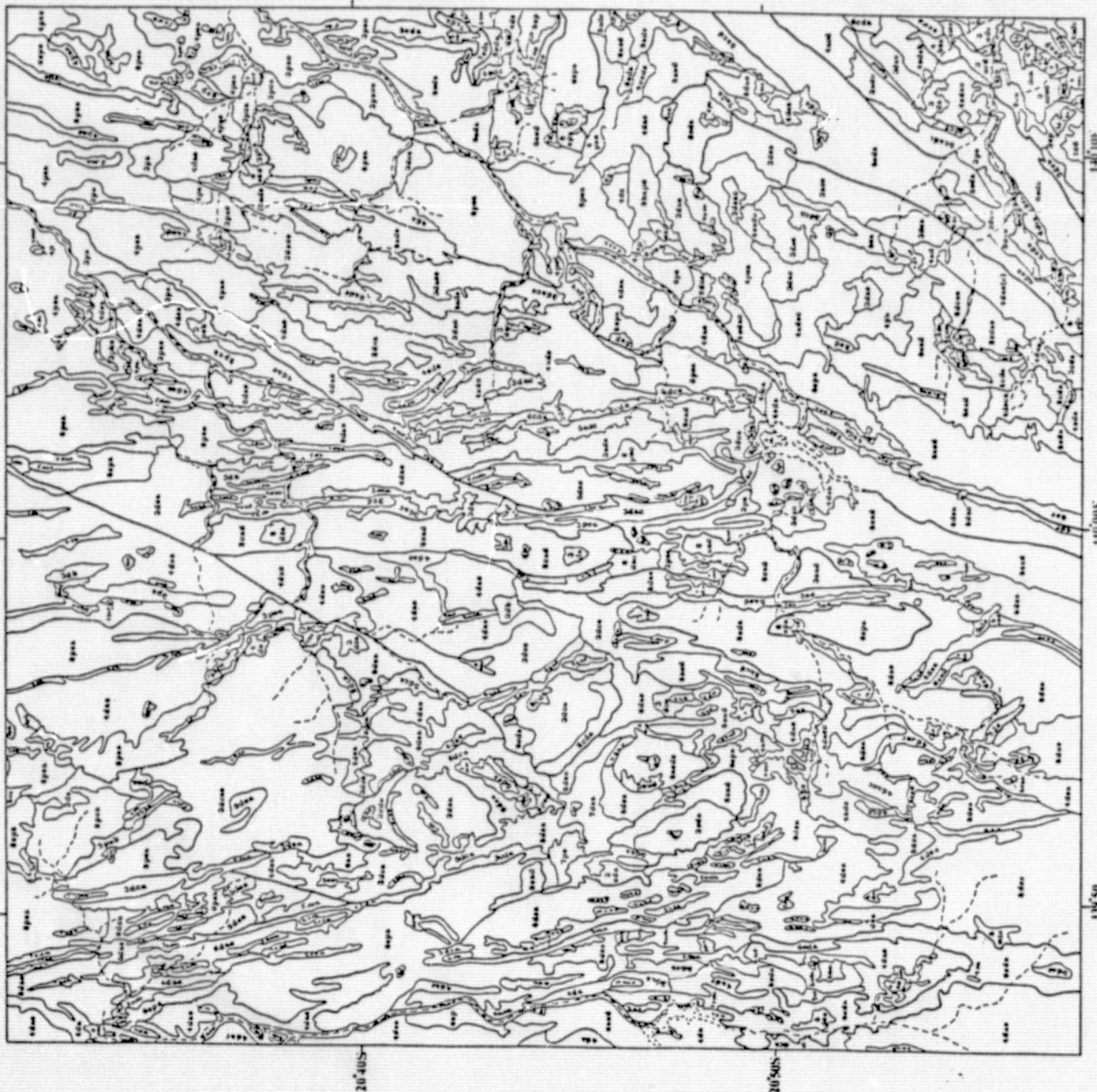
COLOUR

a Red
 b Orange
 c Yellow
 d Green
 e Blue
 f Indigo
 g Violet
 h Pink
 j Purple
 k Brown
 n Cyan
 p Emerald Green
 w Grey
 x White
 z Black

MARY KATHLEEN AREA

Enlarged section (grid section 24)
interpreted at a scale of 1:50,000

Combination of LANDSAT 1 { MSS 4 (096)+blue filter
frames imaged on 22nd Dec. 1972: { MSS 5 (127)+green filter
MSS 7 (189)+red filter



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Figure 8

The Mary Kathleen Area. Spectral signatures recognised on the colour composite generated from positives of MSS bands 4, 5 and 7 of LANDSAT 1 imagery covering grid section 24 of the Cloncurry - Dobbyn frame. LANDSAT 1 : ID 1152-00073 22 December 1972.

MARY KATHLEEN AREA

Enlarged section (grid section 24)
interpreted at a scale of 1:50,000

Combination of LANDSAT 1
frames imaged on 22nd Dec. 1972: {
MSS 4 (096) + blue filter
MSS 5 (127) + green filter
MSS 7 (189) + red filter

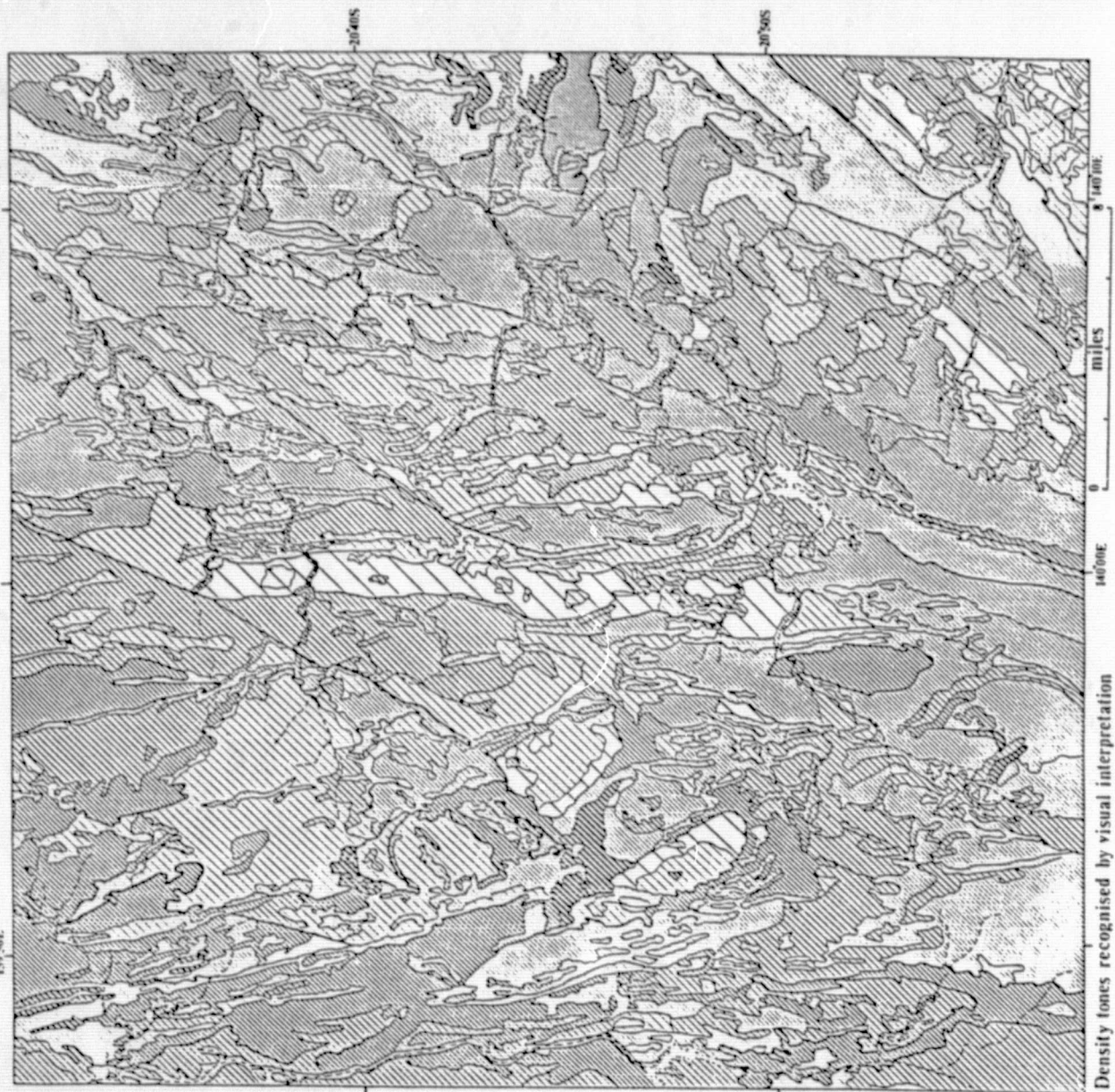


Figure 9

The Mary Kathleen Area. Density tones of spectral signatures recognised on the colour composite generated from positives of MSS bands 4, 5 and 7 of LANDSAT 1 imagery covering grid section 24 of the Cloncurry-Dobbyn frame. LANDSAT 1: ID 1152-00073: 22 December 1972.

Enlarged section (grid section 24)
interpreted at a scale of 1:50,000

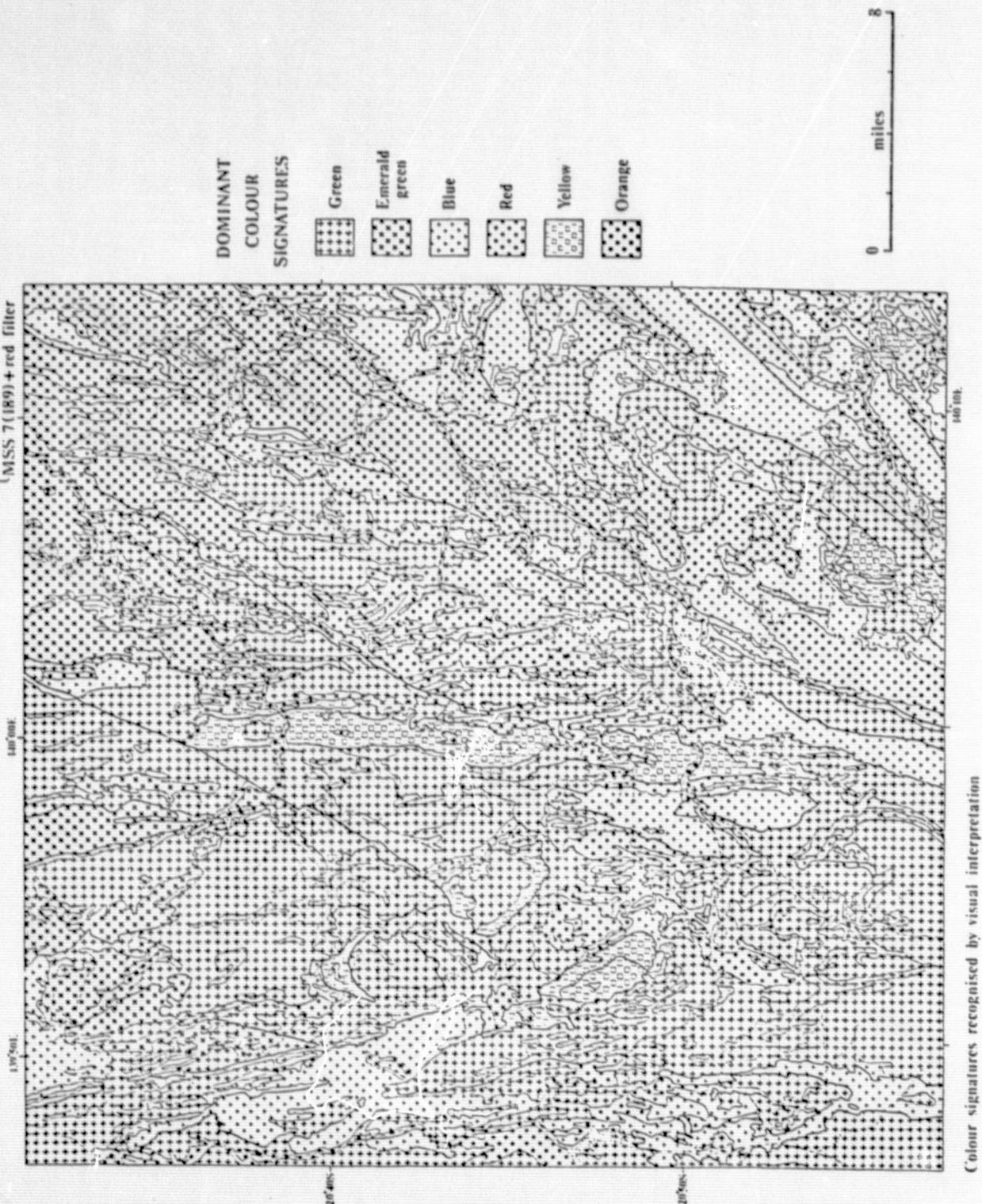


Figure 10

The Mary Kathleen Area. Hues of colour recognised in the spectral signatures on colour composite generated from positives of MSS bands 4, 5 and 7 of LANDSAT 1 imagery covering grid section 24 of the Cloncurry-Dobbyn frame. LANDSAT 1 : ID 1152-00073: 22 December 1972.

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MARY KATHLEEN AREA: FAULTS

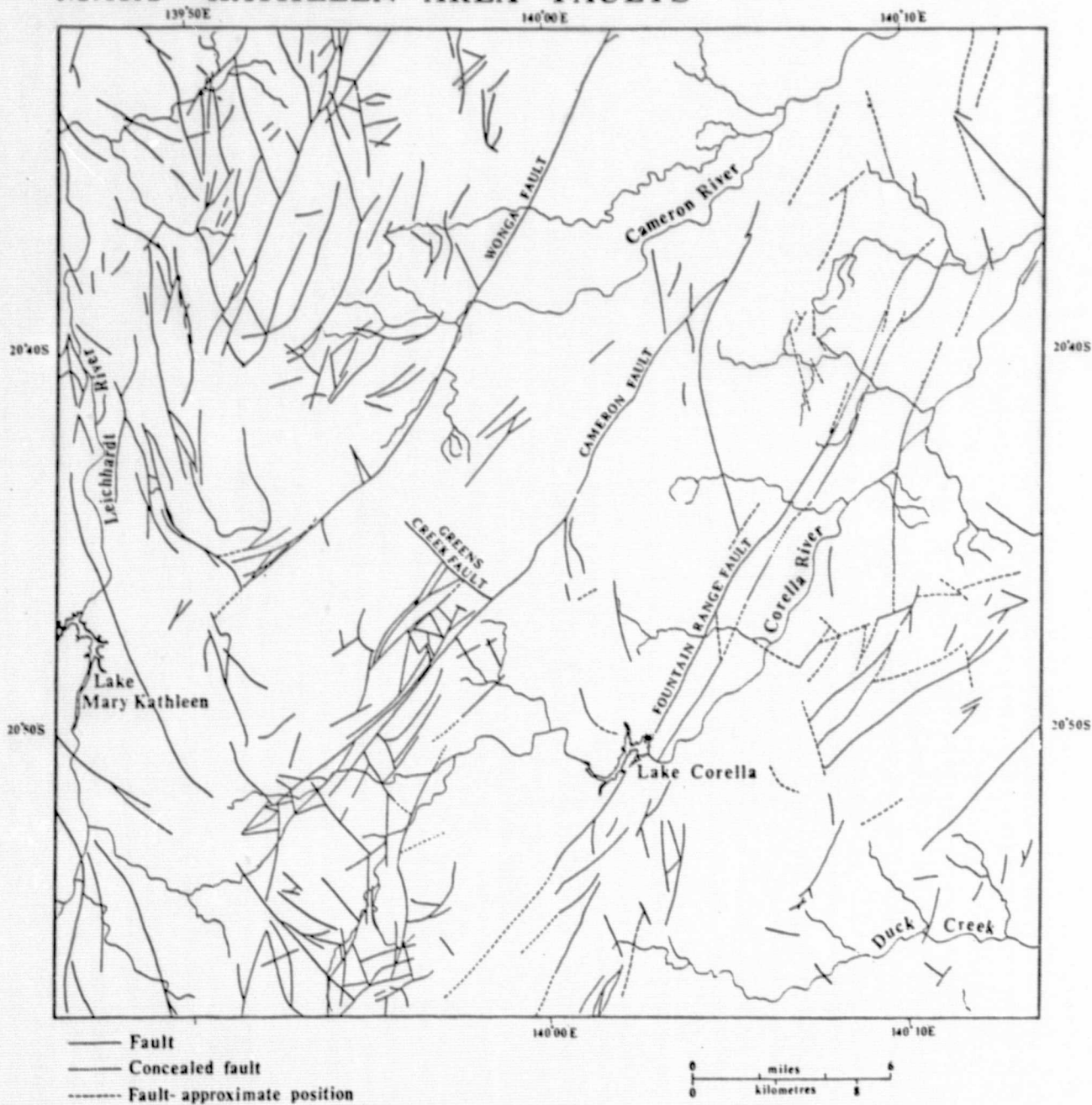
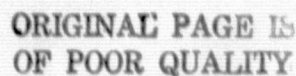


Figure 11

The Mary Kathleen Area: major fault structures. (From the Bureau of Mineral Resources 1:100,000 geological maps, Mary Kathleen sheet 6856 and Marraba sheet 6956)

MSS 4 (201) + blue filter
MSS 5 (217) + green filter
MSS 7 (249) + red filter



The Mary Kathleen Area. Spectral signatures recognised on colour composite generated from MSS bands 4, 5 and 7 of LANDSAT 2 imagery covering grid section 24 of Cloncurry-Dobbyn frame. LANDSAT 2 : ID 2039-23555: 2 March 1975.

MARY KATHLEEN AREA

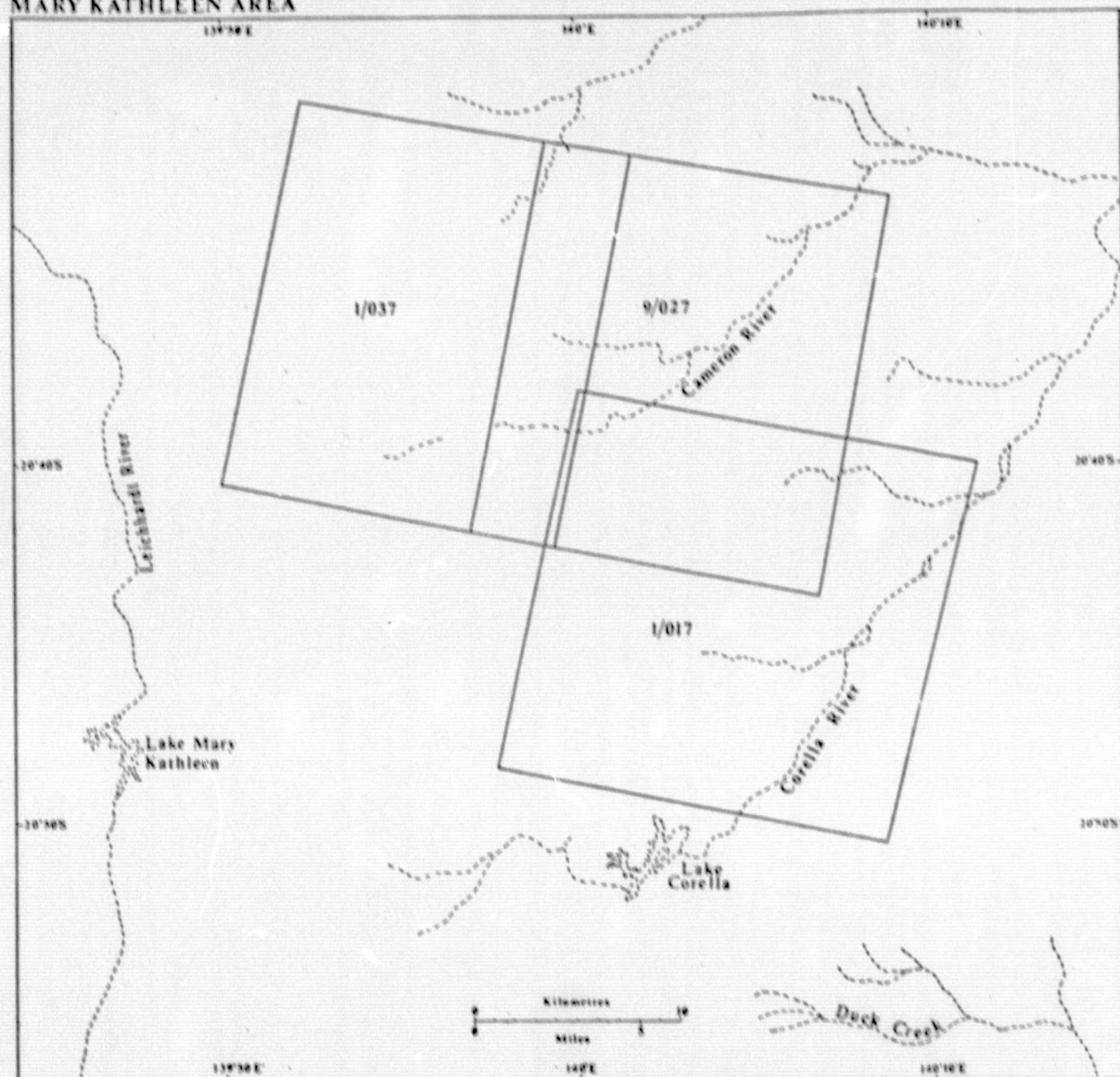


Figure 13

The Mary Kathleen Area. Location of colour composites generated from MSS bands 4, 5 and 7 of the CCTs of the LANDSAT 2 imagery. ID 2039-23555: 2 March 1975 and interpreted in figures 14, 19, 20, 21, 23 and 24.

MARY KATHLEEN: Multispectral signatures

CCT image resolution of 1x1 pixel

Combination of LANDSAT 2 bands

Band 4 + blue filter

interpreted at a scale of 1:28,000

imaged on 2nd March 1975

Band 5 + green filter

Job 1/017

I.D. No. 2039 23555

Band 7 + red filter

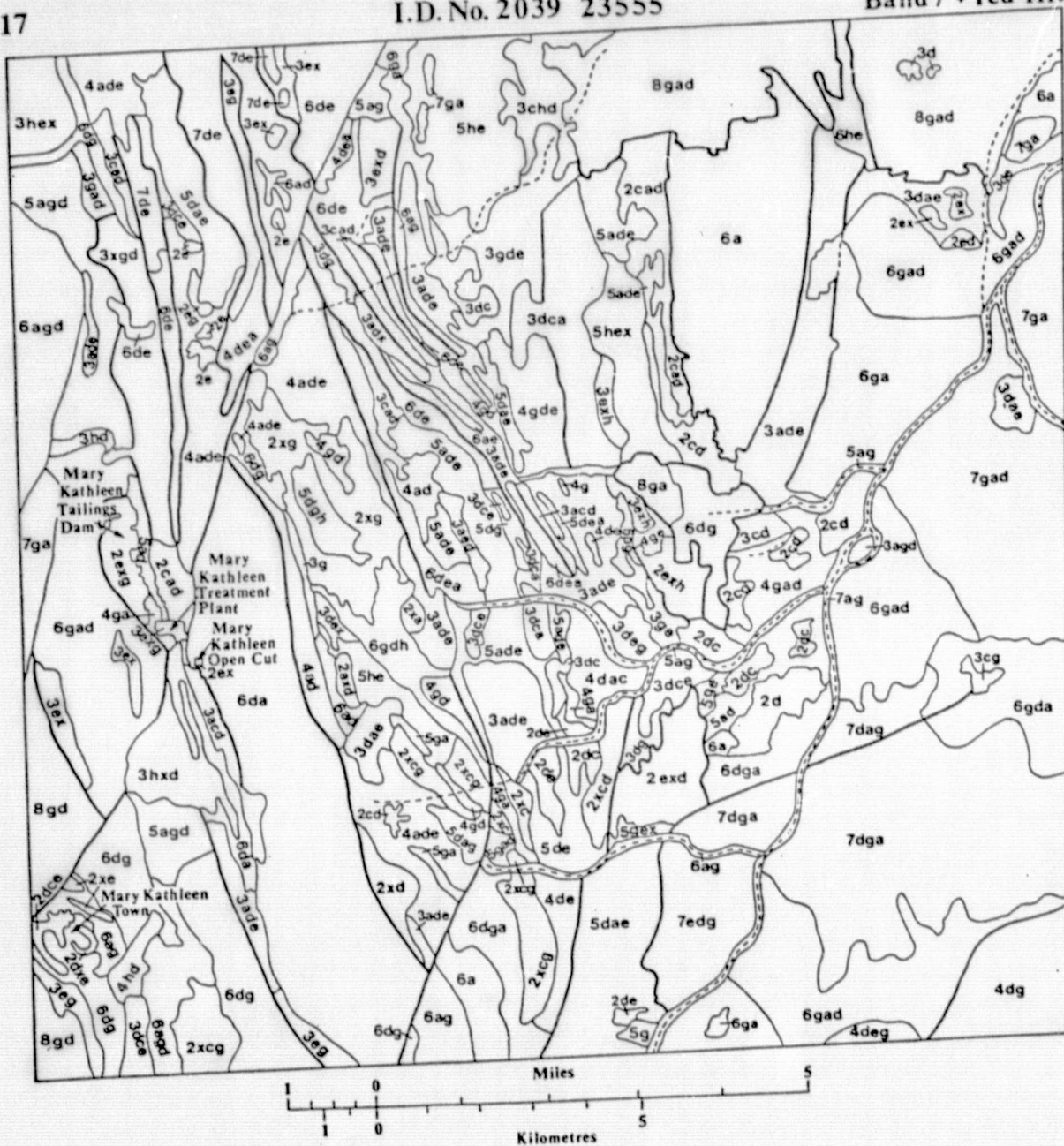
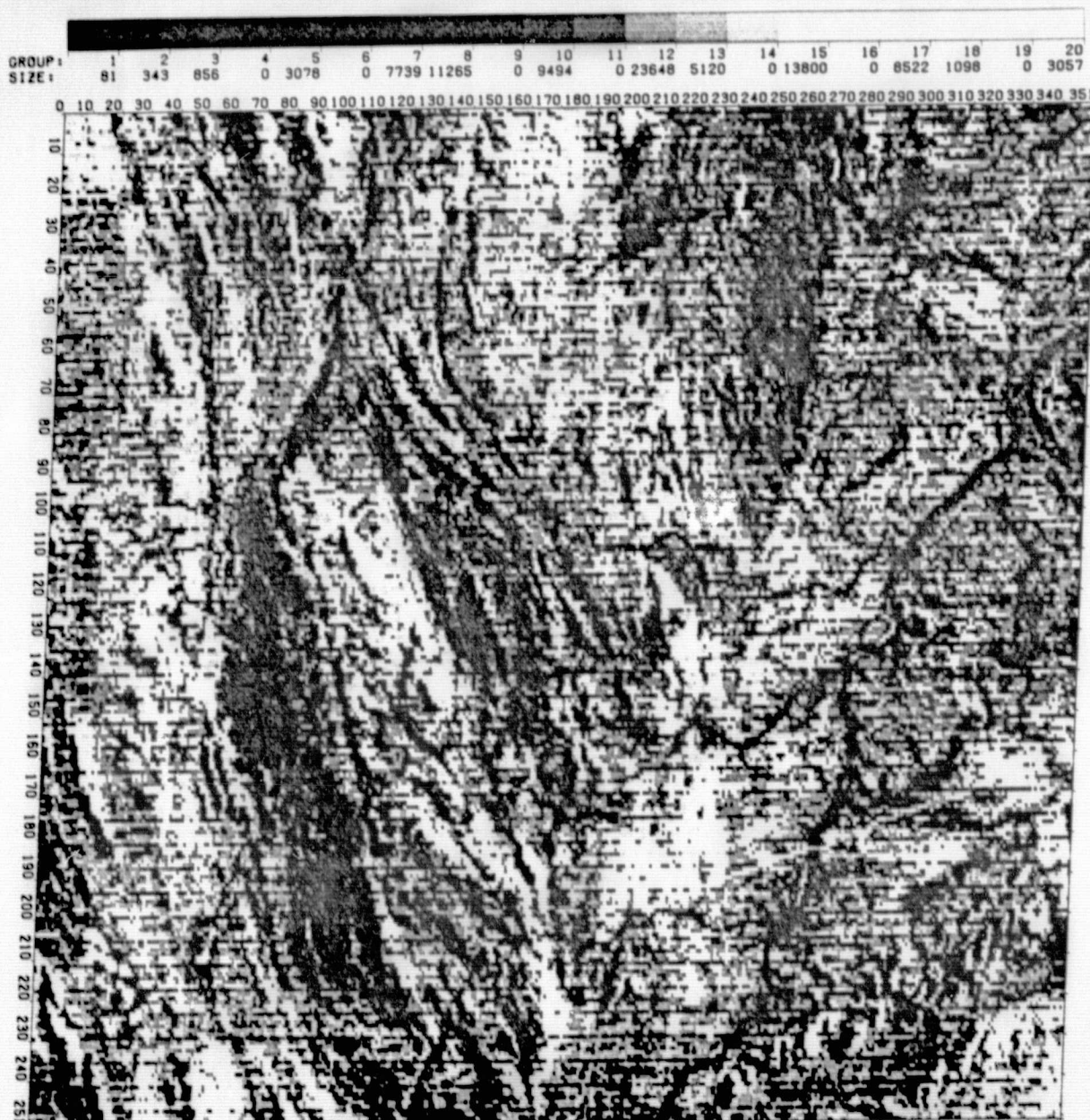


Figure 14

The Mary Kathleen Area. Spectral signatures recognised on the colour composite generated from MSS bands 4, 5 and 7 of the CCTs of LANDSAT 2 : ID 2039-23555: 2 March 1975.

MARY KATHLEEN AREA, QUEENSLAND CCT 2039-23555 2/3/75 1*1 PIXEL JOB 1/017 9L
 20 GROUPS - SLICE: LANDSAT BAND 4 RANGE 100.0 TO 190.0



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Figure 15

The Mary Kathleen Area. Output produced by density
 slicing the data in MSS band 4 into twenty groups.
 Output from CCT of LANDSAT 2 : ID 2039-23555:
 2 March 1975

MARY KATHLEEN AREA.QUEENSLAND CCT 2039-23555 2/3/75 1*1 PIXEL
 20 GROUPS - SLICE: LANDSAT BAND 5 RANGE 120.0 TO 330.0

JOB 1/017 \$L
 330.0



Figure 16

The Mary Kathleen Area. Output produced by density slicing the data in MSS band 5 into twenty groups. Output from CCT of LANDSAT 2: ID 2039-23555: 2 March 1975.

MARY KATHLEEN AREA, QUEENSLAND CCT 2039-23555 2/3/75 1-1 PIXEL JOB 1/017 \$L
 20 GROUPS - SLICE: LANDSAT BAND 6 RANGE 160.0 TO 440.0

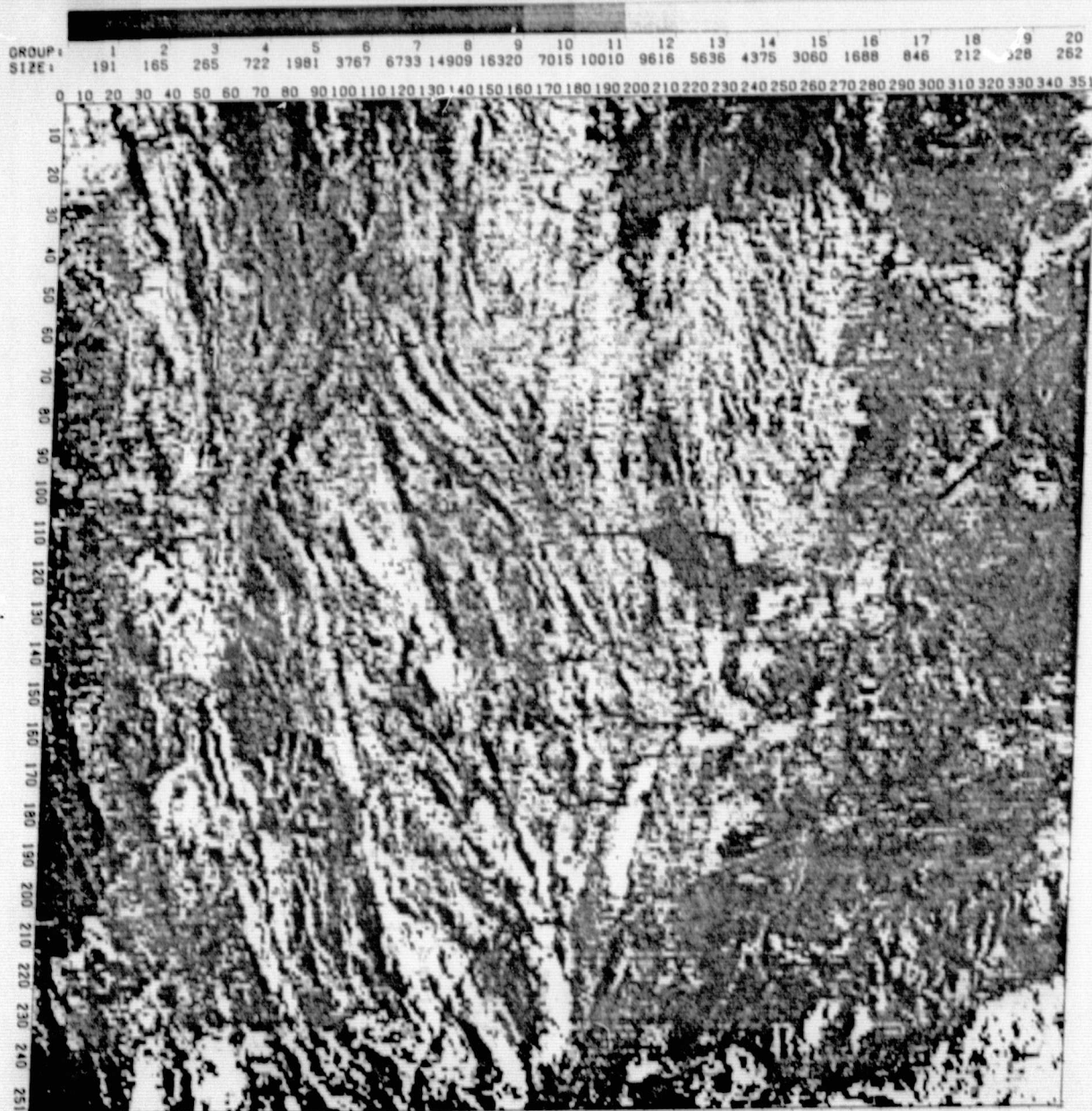


Figure 17

The Mary Kathleen Area. Output produced by density slicing the data in MSS band 6 into twenty groups. Output from CCT of LANDSAT 2: ID 2039-23555: 2 March 1975.

MARY KATHLEEN AREA, QUEENSLAND CCT 2039-23555 2/3/75 1=1 PIXEL JOB 1/017 \$L
 20 GROUPS - SLICE: LANDSAT BAND 7 RANGE 50.00 TO 200.0

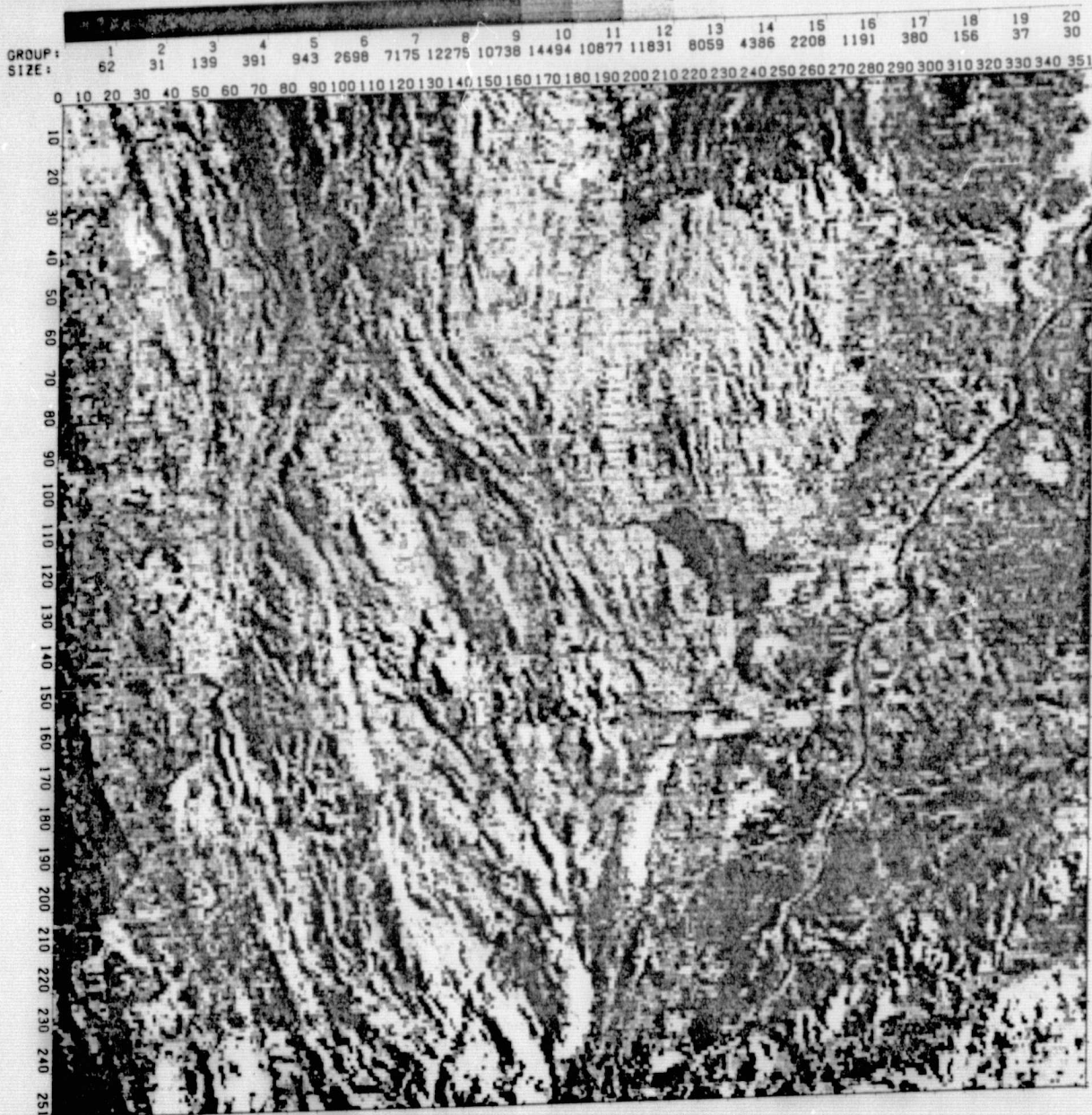


Figure 18

The Mary Kathleen Area. Output produced by density slicing the data in MSS band 7 into twenty groups. Output from CCT of LANDSAT 2: ID 2039-23555: 2 March 1975.

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MARY KATHLEEN AREA: Structural features interpreted from LANDSAT 2 imagery on 2nd March 1975 (from colour composite of MSS bands 4, 5 and 7 and density slices of MSS bands 4, 5, 6 and 7)

I.D. No. 2039 23555

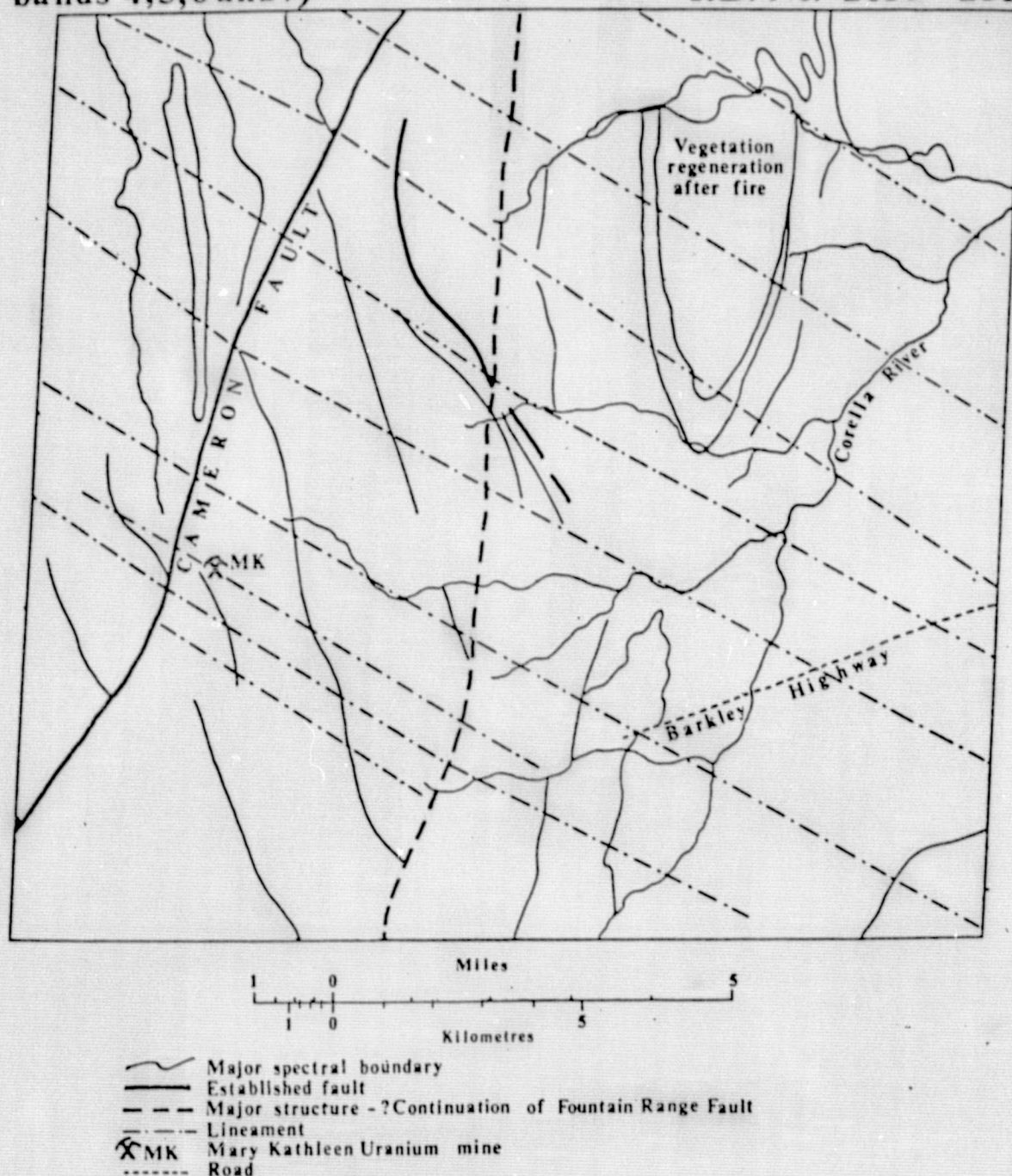


Figure 19

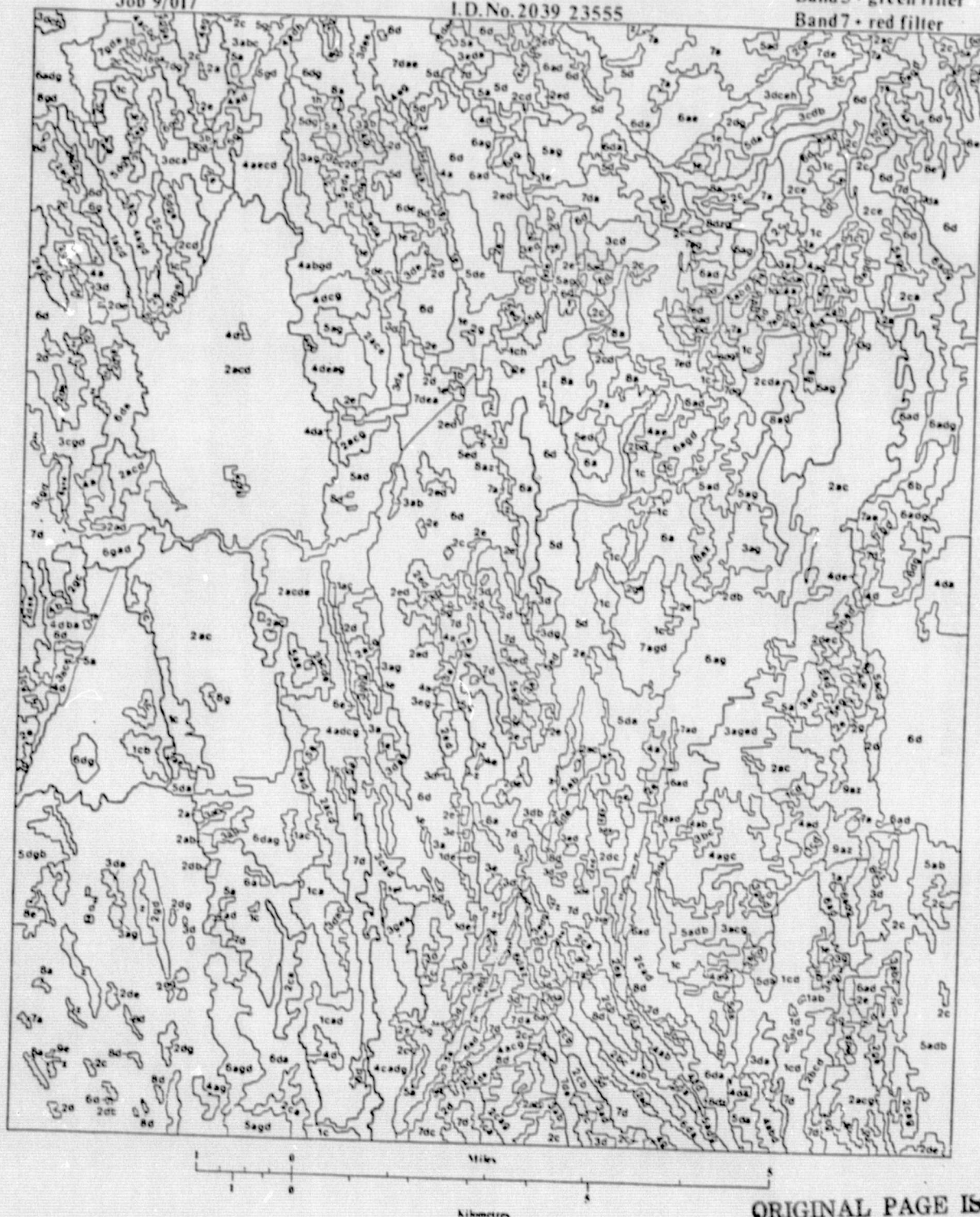
Mary Kathleen Area. Structural features identified on the colour composite generated from MSS bands 4, 5 and 7 from the CCTs of LANDSAT 2 imagery: ID 2039-23555: 2 March 1975.

MARY KATHLEEN NORTHWEST: Multispectral signatures

CCT image resolution 1x1 pixel
interpreted at a scale of 1:30,000
Job 9/017

Combination of LANDSAT 2 bands
imaged on 2nd March 1975
I.D.No. 2039 23555

Band 4 • blue filter
Band 5 • green filter
Band 7 • red filter



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Figure 20

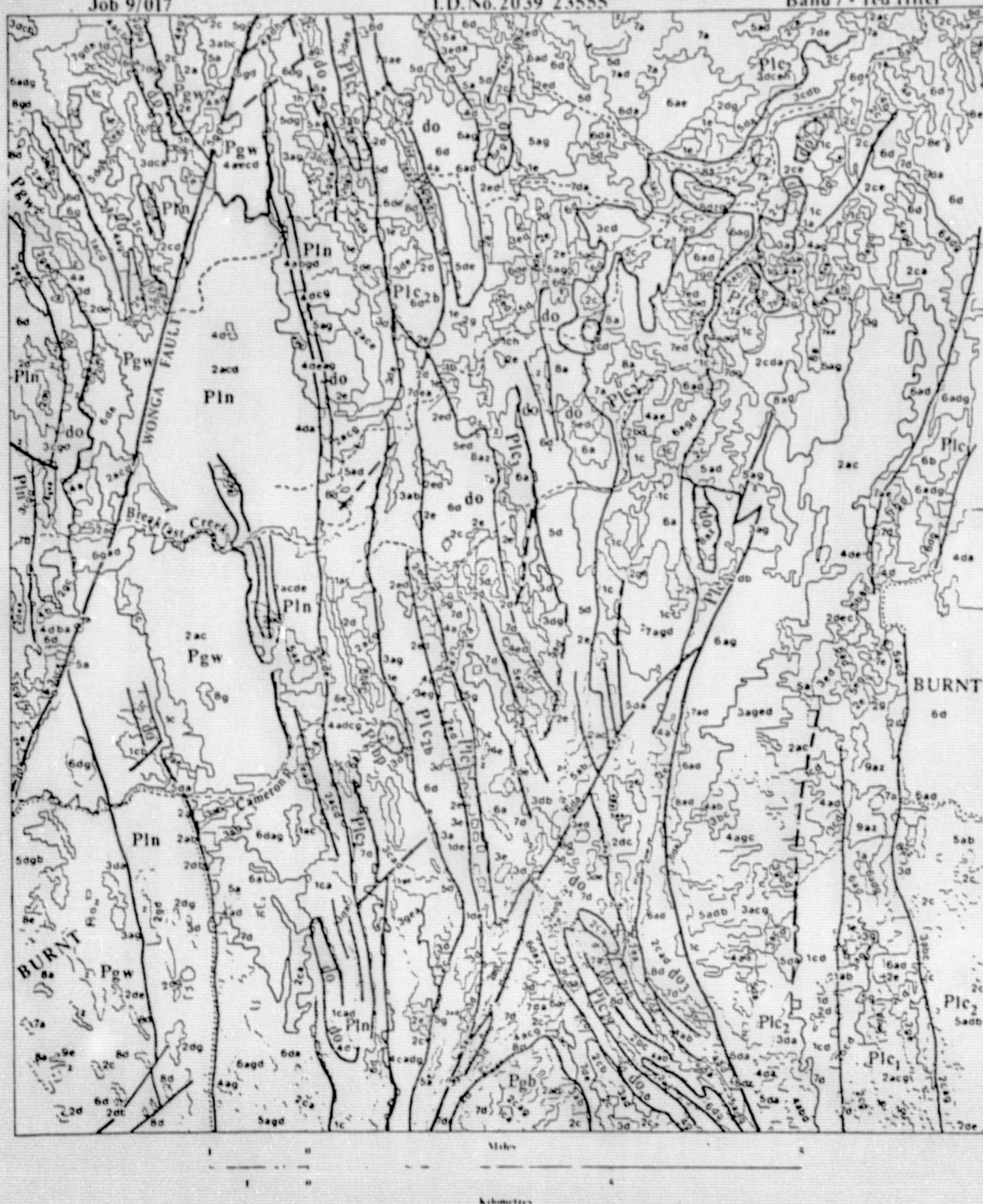
The Mary Kathleen Area. Spectral signatures recognised on the colour composite generated from MSS bands 4, 5 and 7 of the CCTs of LANDSAT 2 imagery covering the area northwest of Mary Kathleen. LANDSAT 2 : ID 2039-23555: 2 March 1975.

MARY KATHLEEN NORTHWEST: Multispectral signatures

CCT image resolution 1x1 pixel
interpreted at a scale of 1:30,000
Job 9/017

Combination of LANDSAT 2 bands
imaged on 2nd March 1975
I.D.No. 2039 23555

Band 4 - blue filter
Band 5 - green filter
Band 7 - red filter



Geology Interpreted from CCT Composite (MMC/JKM) April 1977

Figure 21

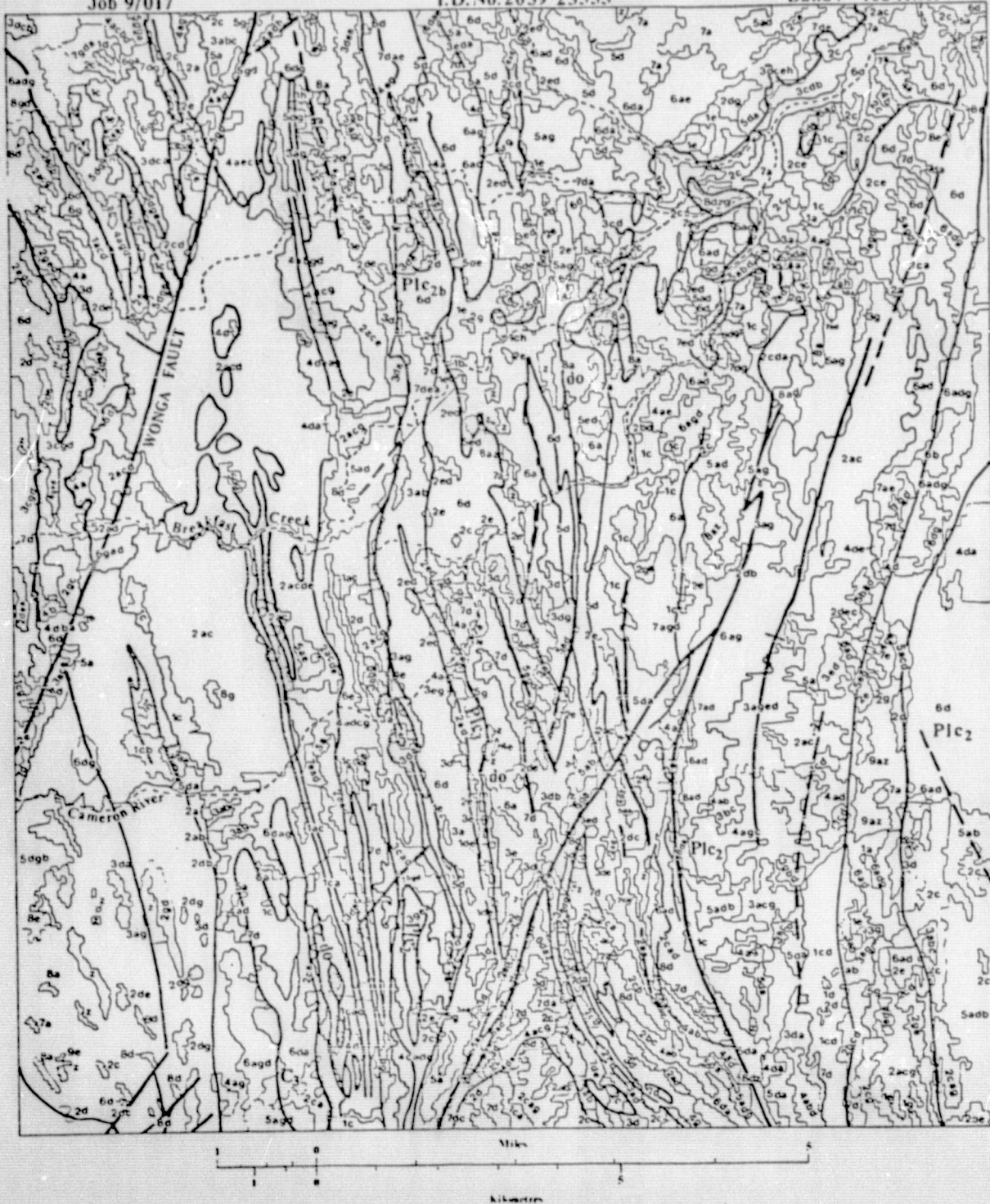
The Mary Kathleen Area. Geology interpreted from the colour composite generated from MSS bands 4, 5 and 7 of the CCTs of LANDSAT 2 imagery covering the area northwest of Mary Kathleen. LANDSAT 2: ID 2039-23555: 2 March 1975.

MARY KATHLEEN NORTHWEST: Multispectral signatures

CCT image resolution 1x1 pixel
interpreted at a scale of 1:30,000
Job 9/017

Combination of LANDSAT 2 bands
imaged on 2nd March 1975
I.D.No.2039 23555

Band 4 + blue filter
Band 5 + green filter
Band 7 + red filter



² Geology after BMR 1:50,000 Marraba 6956 IV

Figure 22

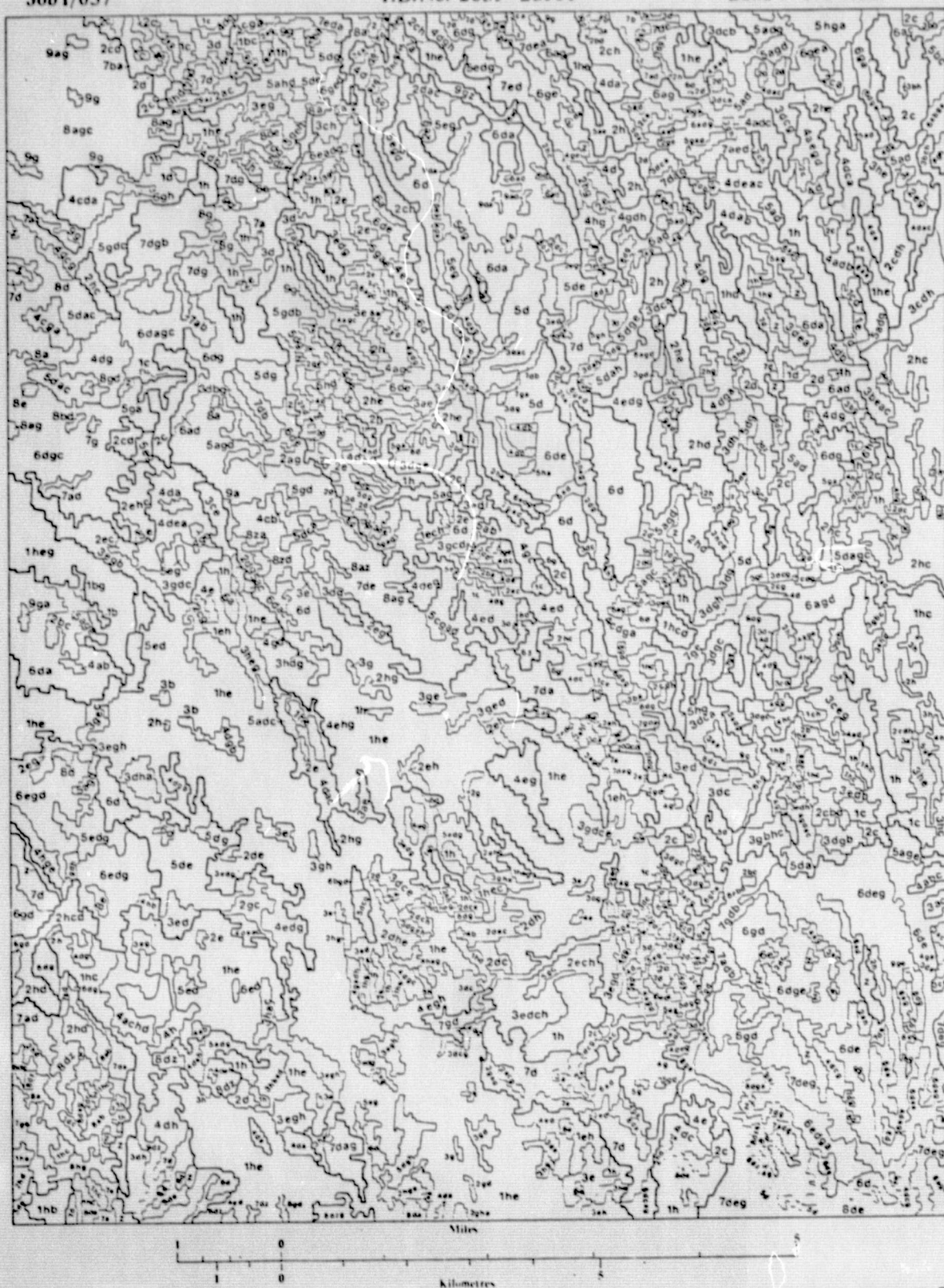
The Mary Kathleen Area. Geology of the area northwest of Mary Kathleen after Bureau of Mineral Resources 1:50,000 Geological Series, Marraba Sheet 6956 IV

MARY KATHLEEN WEST: Multispectral signatures

CCT image resolution 1K pixel
interpreted at a scale of 1:30,000
Job1/037

Combination of LANDSAT 2 bands
imaged on 2nd March 1975
I.D.No. 2039 23555

Band 4 - blue filter
Band 5 - green filter
Band 7 - red filter



MARY KATHLEEN WEST: Multispectral signatures

CCT image resolution 1x1 pixel
interpreted at a scale of 1:30,000
Job 1/037

Combination of LANDSAT 2 bands
imaged on 2nd March 1975
I.D.No. 2039 23555

Band 4 - blue filter
Band 5 - green filter
Band 7 - red filter



Figure 24

The Mary Kathleen Area. Geology interpreted from the colour composite generated from MSS bands 4, 5 and 7 of the CCTs of LANDSAT 2 imagery covering the area west of the Wonga fault. LANDSAT 2: ID 2039-23555: 2 March 1975.

CCT image resolution 1x1 pixel
interpreted at a scale of 1:30,000
Job 1/037

Combination of LANDSAT 2 bands
imaged on 2nd March 1975
I.D.No. 2039 23555

Band 4 • blue filter
Band 5 • green filter
Band 7 • red filter

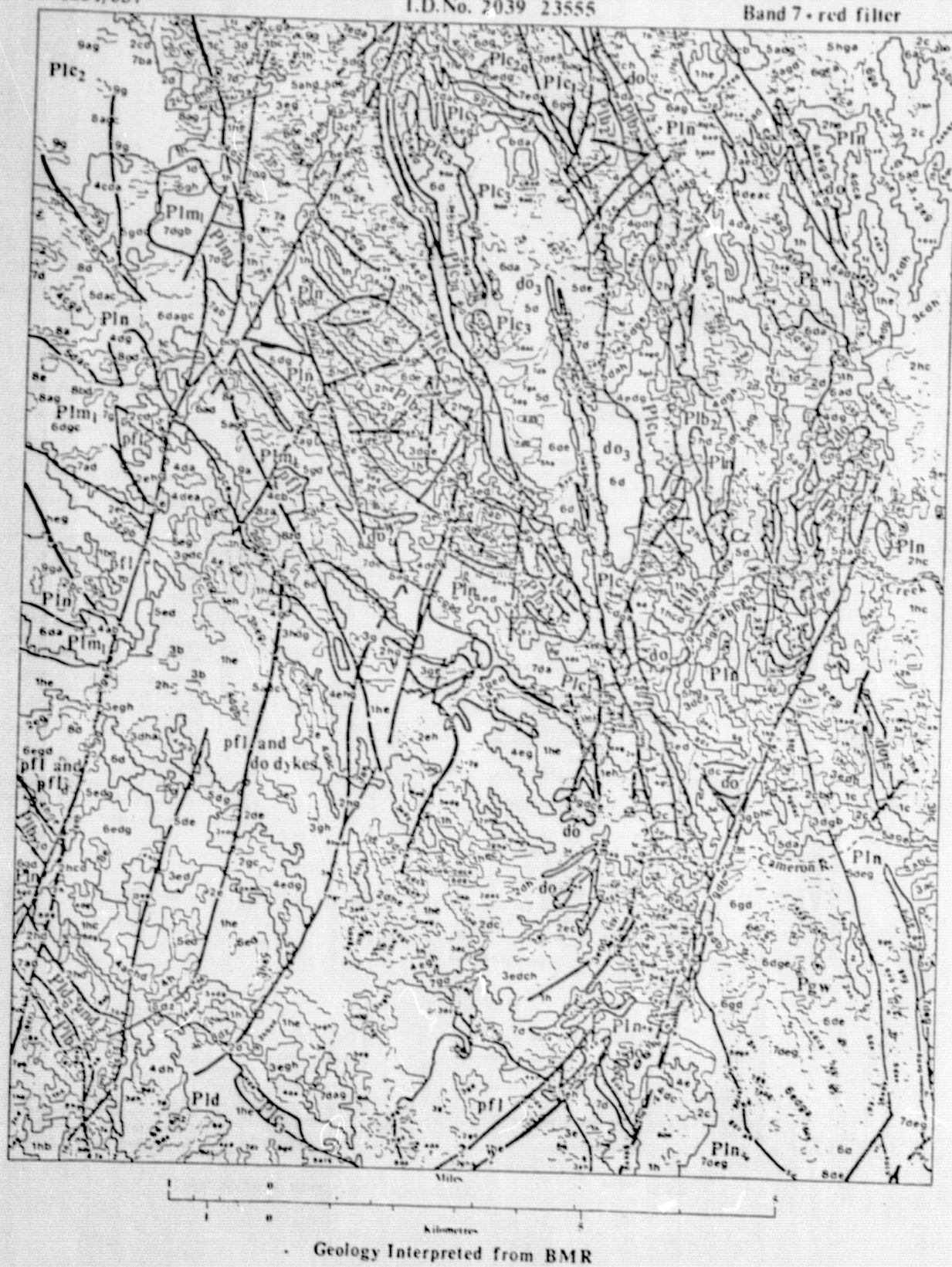


Figure 25

The Mary Kathleen Area. Geology after the Bureau of Mineral Resources 1:50,000 Geological Series, Marraba Sheet 6956 IV and Mary Kathleen sheet 6856.

CAINOZOIC

MESOZOIC

		Soil, sand, alluvium
	C	Conglomerate, sandstone, siltstone, porcellanite, chert, laterite
Lakeview Dolerite dyke		Dolerite, metadolerite: various ages
Burstall Granite		Medium to coarse granite, microgranite, aplite
Naraku Granite		Medium to coarse leucogranite
		Coarse to medium pyroxene dolerite
Lunch Creek Gabbro		Olivine-pyroxene gabbro,
Marimo Slate		Undivided: siltstone, slate, marl, limestone, calcareous sandstone
		Undivided: ferruginous siltstone, fine sandstone, conglomerate, marl
Mick Creek sandstone member		Fine to coarse sandstones, quartzites
		Undivided: siltstone, grey & brown shale
Toby Barty sandstone member		Fine to medium sandstone, quartzite
		Grey & black carbonaceous slate
		Siltstone, marl, limestone
		Limestone, marl, siltstone
		Phyllite, mica schist, siltstone
		Metadolerite, amphibolite
Corella Formation		Undivided: calcareous granofels, limestone, schist, quartzite
		Calcareous breccia, limestone, hematite pods
		Schist, phyllite, phyllonite
		Undivided: calc-silicate granofels, limestone, marl, para-amphibolite
		Quartzite
		Undivided: calcareous sandstone, slate, schist, marl
		Slate, with andalusite, kyanite, garnet, graphite,
		Limestone, calcareous granofels with diopside, vesuvianite & garnet
		Phyllite, schist, basic tuff, acid conglomerate
		Metabasalt, basaltic pillow lava, amphibolite

PROTEROZOIC

LOWER PROTEROZOIC OR CARPENTARIAN

CAINOZOIC

MESOZOIC

Upper Cambrian
Middle Cambrian
Palaeozoic

O'Hara Shale
Devoncourt Limestone
Roaring Siltstone
Marimo Slate

		Alluvium, sand, soil
	C	Terrestrial & marine conglomerate, sandstone, shale, limestone
		Shale with interbeds of chert & limestone
		Bituminous limestone
		Siltstone
		Slate, impure quartzite, limestone schist

PROTEROZOIC

(REFERENCE FOR LOWER PART OF MAP)

LOWER PROTEROZOIC?

		Quartzite
		Metaconglomerate
		Garnetite, garnet-diopside skarn
		Undivided: calcareous & calc-silicate granofels, limestone, marl
		Quartzite
Chumvale Breccia		Quartzite breccia & jaspilite remnants
Overhang Jaspilite		Jaspilite, limestone, shale, marl
Mitakoodi Quartzite		Undivided: quartzite, siltstone, basalt, schist, limestone
		Buff silt & shale
Wakeful Basalt Member		Metabasalt, minor siltstone
		Feldspathic quartzite, minor siltstone
Marraba Volcanics	Timberoo Member	Slate, siltstone, sandstone, limestone, marl
	Mount Start Member	Fine calcareous sandstone, limestone, chert
	Cone Creek Volcanic Member	Metabasalt, dolerite, minor arkose
		Metadolerite, amphibolite, schist
Wonga Granite		Coarse foliated granite, fine grained aplite. Coeval with Burstall Granite?
Argylla Formation		Undivided: porphyritic rhyolite, rhyodacite, dacite, quartzite
		Medium to coarse feldspathic quartzite
		Quartz-rich porphyry, porphyritic rhyolite, rhyodacite
		Quartz-poor porphyry, porphyritic dacite & andalusite
		Feldspathic quartzite, siltstone, chert, tuffaceous & epidote-rich sandstone
		Sericite quartzite

(REFERENCE FOR UPPER PART OF MAP)

Mitakoodi Quartzite		Quartzite, metabasalt, tuff, schist
Marraba Volcanics		Metabasalt, tuff, slate, schist, quartzite
		Metadolerite, metabasalt
Argylla Formation		Altered acid lavas, metabasalt, metasediments & metamorphics
Wimberu Granite		Coarse, foliated granite & medium/fine-grained massive granite

THE MARY KATHLEEN AREA: GEOLOGY

Western part of map based on the 1:100,000 Geological Series Sheet 6856
 Eastern part of map based on the 1:100,000 Geological Series Sheet 6956

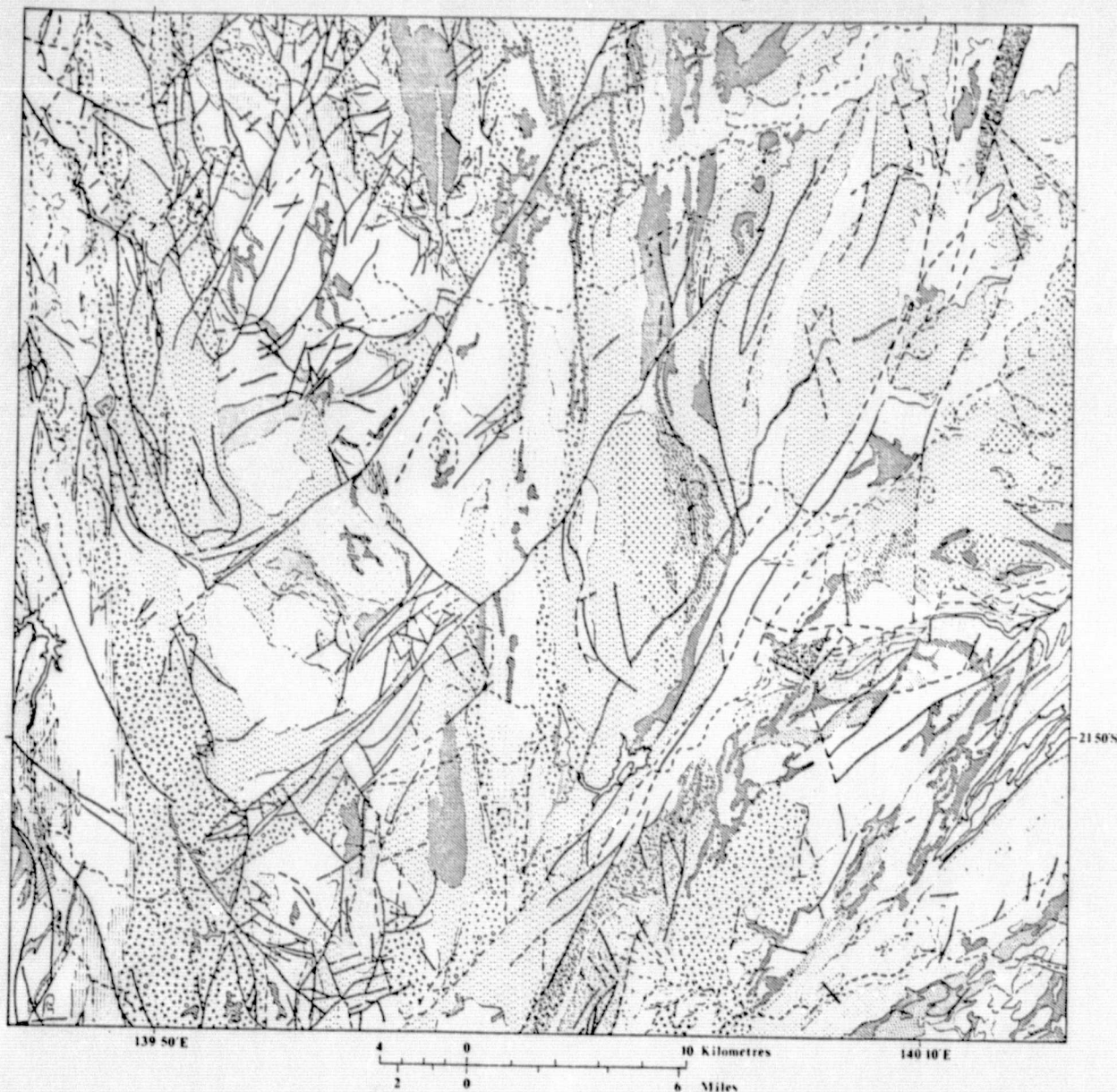


Figure 26 The Mary Kathleen area. Geology after the Bureau of Mineral Resources 1:100,000 Geological Series, Mary Kathleen Sheet 6856 and Marraba Sheet 6956

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Figure 27 The Mitakoodi Anticlinorium. Colour composite generated from
MSS bands 4, 5 and 7 of the LANDSAT 1 imagery ID 1152-00073:
22 December 1972.

THE MITAKOODI ANTICLINORIUM: SPECTRAL SIGNATURES

Enlarged section (grid section 16)
interpreted at a scale of 1:50,000

Combination of LANDSAT 1
frames imaged on 22nd Dec.1972
I.D.No. 1152 00073

(MSS 4(096)+blue filter
MSS 5(127)+green filter
MSS 7(189)+red filter

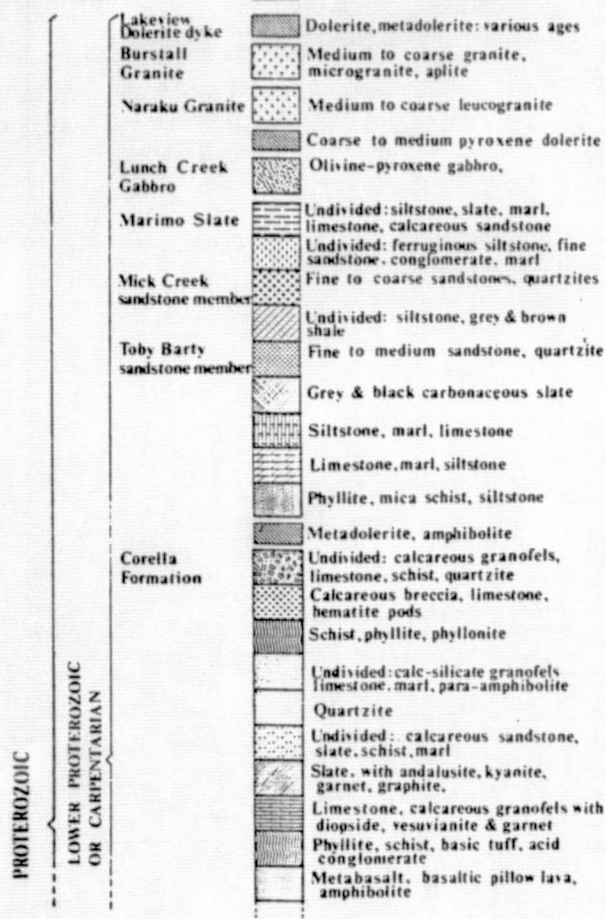


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Figure 28 The Mitakoodi Anticlinorium. Spectral signatures recognised on the colour composite of MSS bands 4, 5 and 7 of grid section 16 of the Cloncurry-Dobbyn frame. LANDSAT I ID1152-00073: 22 December 1972.

CAINOZOIC

MESOZOIC



PROTEROZOIC

LOWER PROTEROZOIC OR CARBONIFEROUS

CAINOZOIC

MESOZOIC

PALAEOZOIC

Upper Cambrian

Middle Cambrian

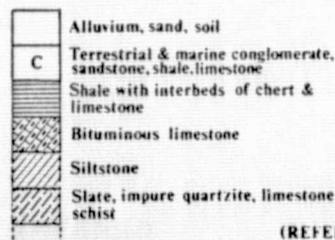
Lower Cambrian

O'Hara Shale

Devoncourt Limestone

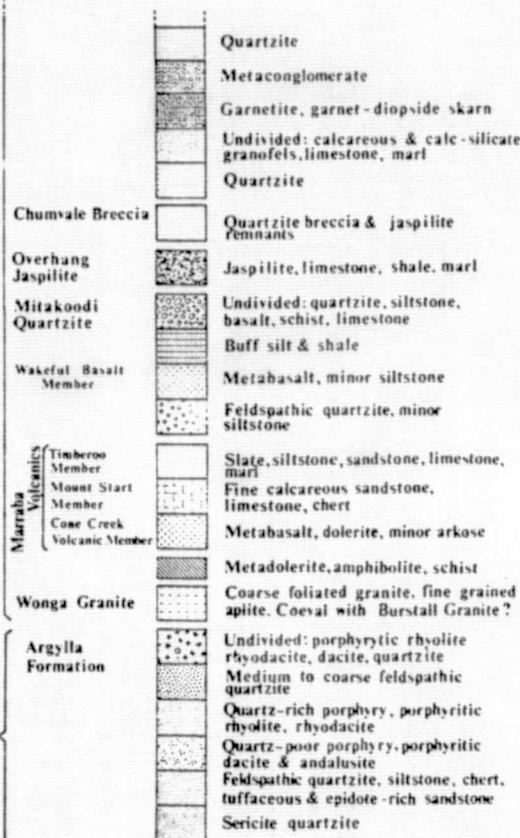
Roaring Siltstone

Marimo Slate

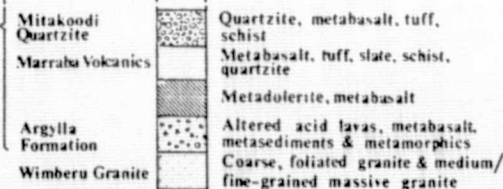


(REFERENCE FOR LOWER PART OF MAP)

LOWER PROTEROZOIC?



(REFERENCE FOR UPPER PART OF MAP)



THE MITAKOODI ANTICLINORIUM: GEOLOGY

Upper part of map based on the 1:100,000 Geological series sheet 6956

Lower part of map based on the 1:253,440 Geological series sheet F54-6

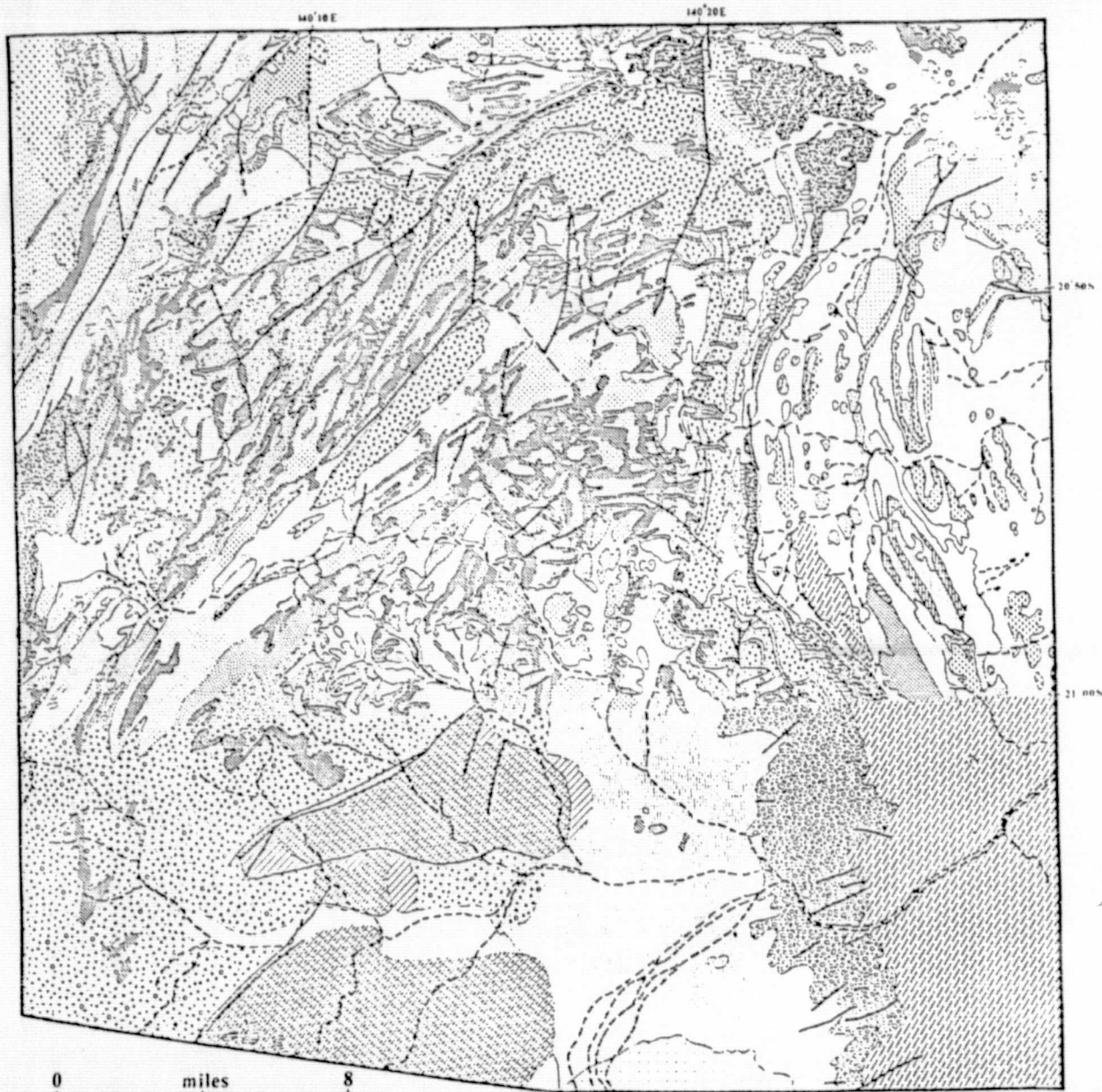


Figure 29

The Mitakoodi anticlinorium: geology based on the Bureau of Mineral Resources 1:100,000 geological map, Marraba sheet 6956 and 1:253,440 geological map, Duchess sheet 54-6.

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FOLD FEATURE - 2*2 PIXELS

ABUT

20 GROUPS - SLICE: PARAMETER 1

RANGE 90.00 TO 200.0

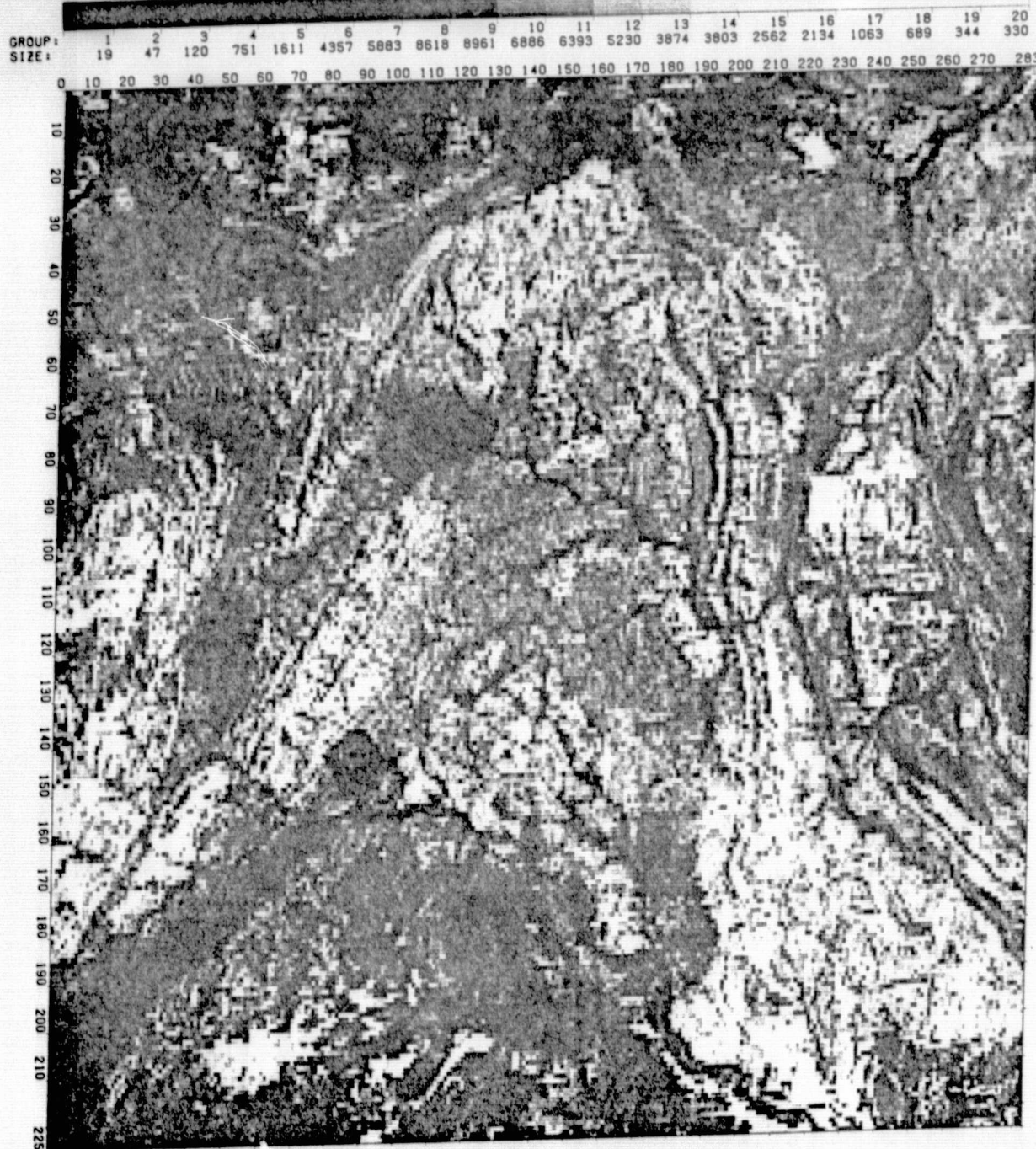


Figure 30 The Mitakoodi anticlinorium. Output produced by density slicing the data in MSS band 4 into twenty groups. Output from CCT of LANDSAT2 . ID 2039-23555. 2 March 1975

FOLD FEATURE - 2*2 PIXELS
20 GROUPS - SLICE: PARAMETER 2

RANGE 110.0 TO 320.0

ABUT



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Figure 31

The Mitakoodi anticlinorium. Output produced by density slicing the data in MSS band 5 into twenty groups. Output from CCT of LANDSAT 2: ID 2039-23555: 2 March 1975

FOLD FEATURE - 2*2 PIXELS

ABUT

20 GROUPS - SLICE: PARAMETER 3

RANGE 170.0 TO 400.0



Figure 32 The Mitakoodi anticlinorium. Output produced by density slicing the data in MSS band 6 into twenty groups. Output from CCT of LANDSAT 2: ID 2039-23555: 2 March 1975

FOLD FEATURE - 2*2 PIXELS

ABUT

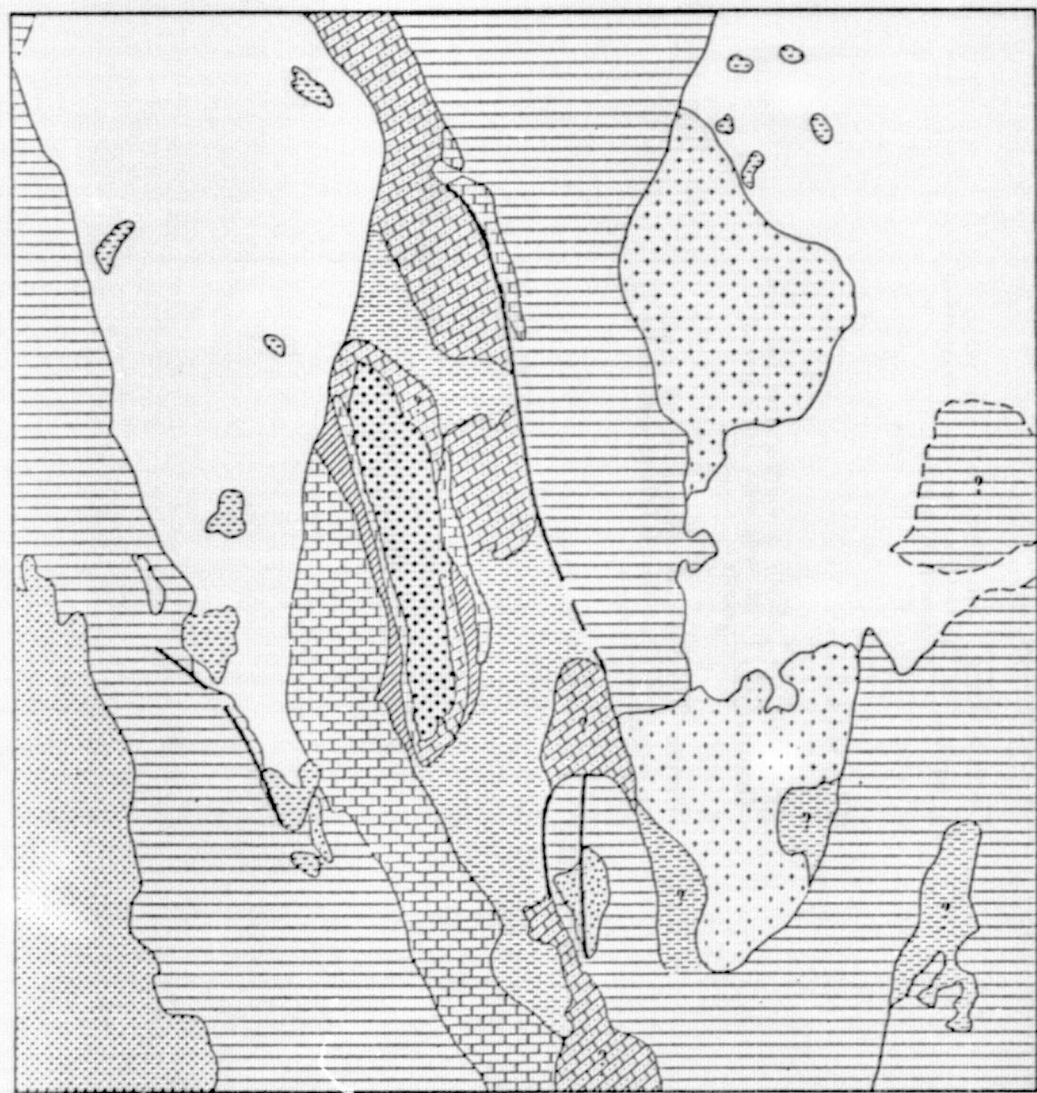
20 GROUPS - SLICE: PARAMETER 4

RANGE 65.00 TO 175.0



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Figure 33 The Mitakoodi anticlinorium. Output produced by density slicing the data in MSS band 7 into twenty groups.
Output from CCT of LANDSAT 2: ID 2039-23555: 2 March 1975



DUGALD RIVER AREA GEOLOGY INTERPRETED FROM ERTS 1 IMAGERY

Figure 34

The Dugald River - Naraku area. Geology interpreted from the colour composite of MSS bands 4, 5 and 7 of grid section 21 of the Cloncurry-Dobbyn frame.
LANDSAT I ID1152-00073; 22 December 1972

CAINOZOIC

Soil and alluvium

MESOZOIC

Conglomerate, sandstone, siltstone, shale and porcellanite

UPPER PROTEROZOIC Quamby conglomerate

Conglomerate, arkose and sandstone

LOWER PROTEROZOIC

Knapdale quartzite

Quartzite

Corella formation

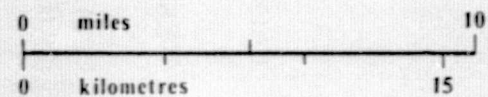
Calc-silicate and related rocks masked by residuum
Calc-silicate and related rocks
Shales and mudstones
Well bedded argillaceous limestone
Undifferentiated calc-silicate rocks

Naraku granite

Mainly medium grained red granite with some older coarse grained granite

Wonga granite

Mainly porphyritic red granite and augen gneiss. Some younger massive granites



CAINOZOIC



Soil and alluvium

MESOZOIC



Conglomerate, sandstone, siltstone, shale, and porcellanite(?)

UPPER
PROTEROZOIC

Quamby
Conglomerate



Conglomerate, arkose and sandstone

LOWER
PROTEROZOIC



Dolerite

Knapdate
Quartzite



Quartzite

Corella
Formation



Calc-silicate rocks with schist, quartzite, slate and re-crystallized limestone breccia

GRANITES

Naraku
Granite



Mainly medium grained red granite, with some older coarse grained granite

Wonga
Granite



Mainly porphyritic red granite, porphyritic foliated and massive granite

DUGALD RIVER AREA: Geology after Bureau of Mineral Resources map, Cloncurry sheet, first edition 1958

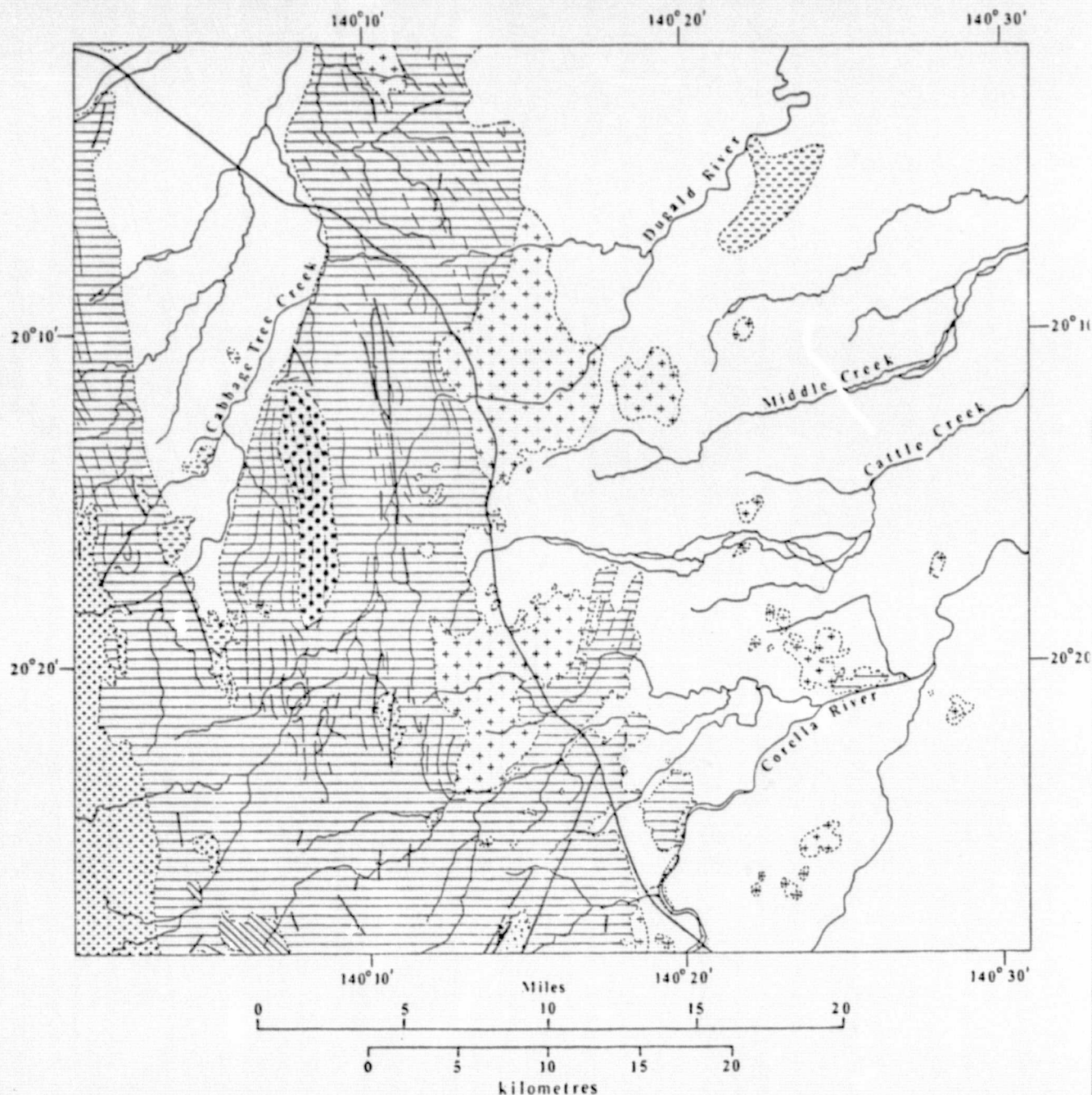


Figure 35 The Dugald River - Naraku area. Geology. (After Bureau of Mineral Resources 1:253,440 geological series sheet F54-2, Cloncurry).

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Figure 36

The Dugald River - Naraku Area. Colour composite generated from MSS bands 4, 5 and 7 of LANDSAT 2 imagery covering grid section 21 of the Cloncurry-Dobbyn frame. LANDSAT 2 : ID 2039-23555: 2 March 1975.

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THE DUGALD RIVER AREA: MULTISPECTRAL SIGNATURES

Enlarged section (grid section 21)
interpreted at a scale of 1:50,000

Combination of LANDSAT 2
frames imaged on 2nd March 1975
I.D.No. 2039 23555

MSS 4(201)+blue filter
MSS 5(217)+green filter
MSS 6(249)+red filter

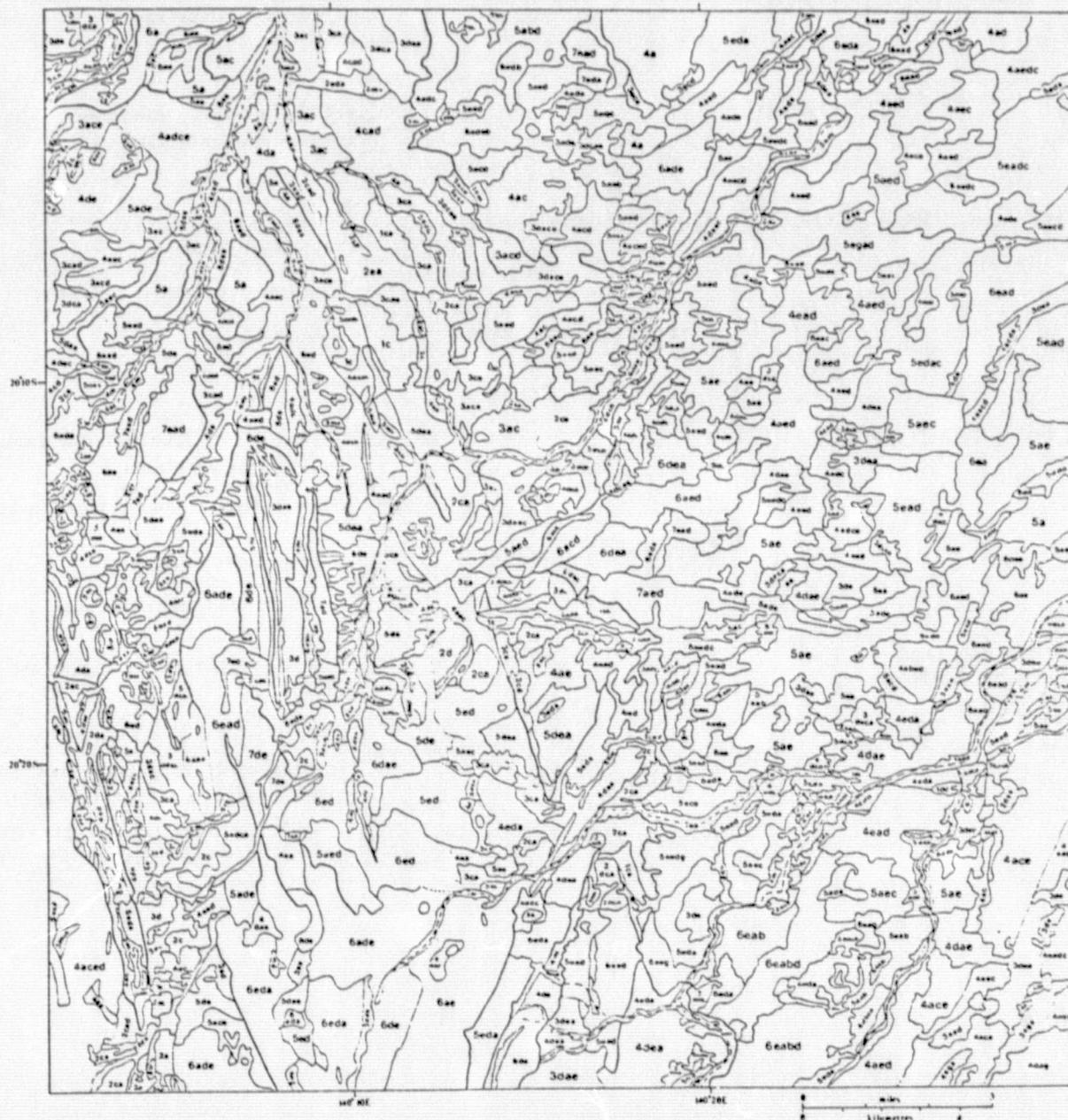


Figure 37

The Dugald River - Naraku area. Spectral signatures recognised on colour composite of MSS bands 4, 5 and 7 of grid section 21 of the Cloncurry - Dobbyn frame. LANDSAT 2; ID2039-23555; 2 March 1975.

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CAINOZOIC



Soil and alluvium

MESOZOIC



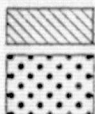
Conglomerate, sandstone, siltstone, shale and porcellanite

UPPER PROTEROZOIC Quamby conglomerate



Conglomerate, arkose and sandstone

Knapdale quartzite



Gabbro, micro-gabbro & dolerite



Quartzite

LOWER PROTEROZOIC

Corella formation



Calc-silicate and related rocks masked by residuum



Calc-silicate and related rocks



Shales and mudstones



Well bedded argillaceous limestone



Undifferentiated calc-silicate rocks

---- Lead-zinc ore body

Naraku granite



Mainly medium grained red granite with some older coarse grained granite

Wonga granite



Mainly porphyritic red granite and augen gneiss. Some younger massive granites

DUGALD RIVER AREA: Geology interpreted from
 combination of LANDSAT 2 frames MSS4 (201)+blue filter
 imaged on 2nd March 1975
 I.D.No. 2039 23555
 MSS5(217)+green filter
 MSS7(247)+red filter

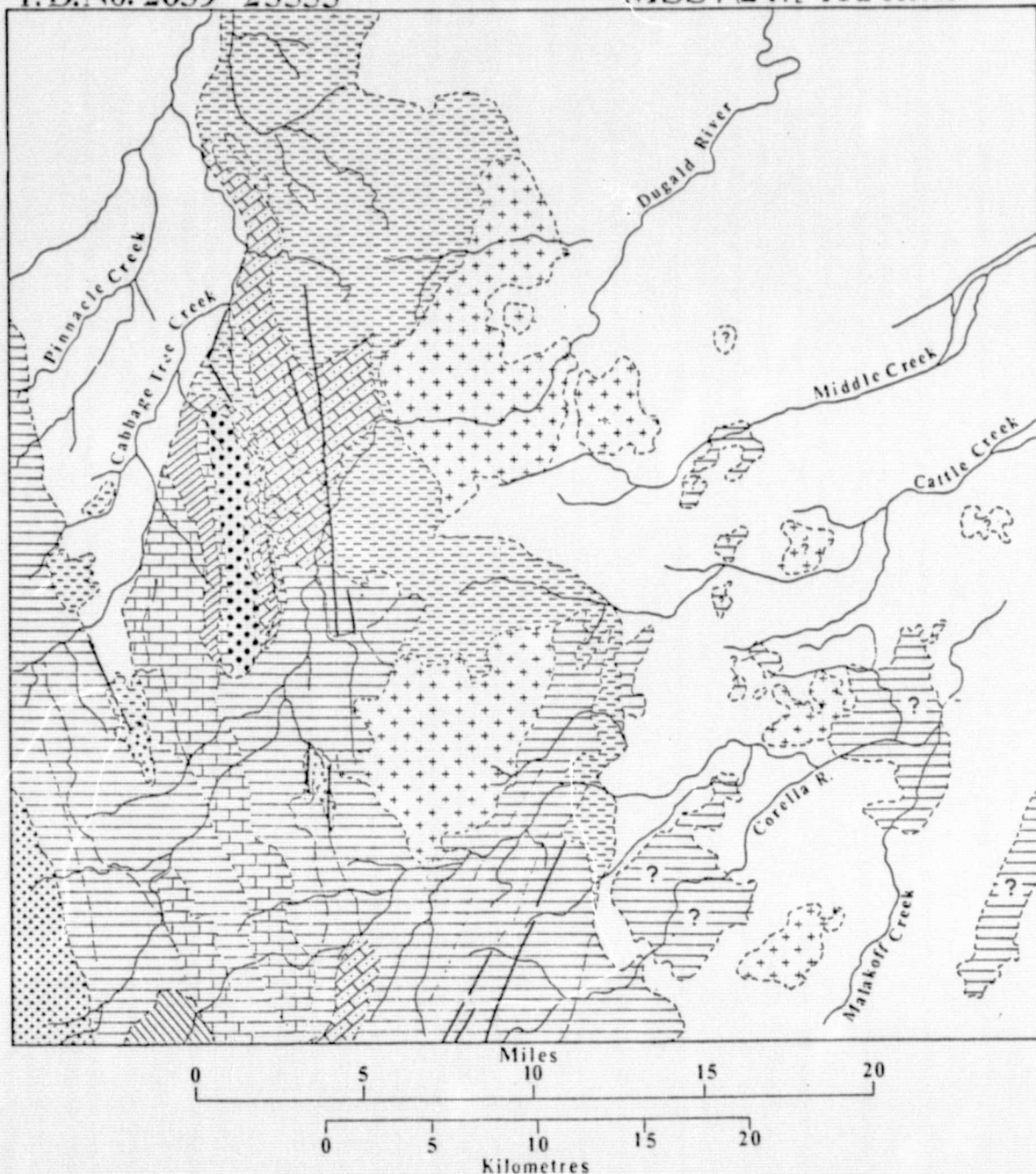
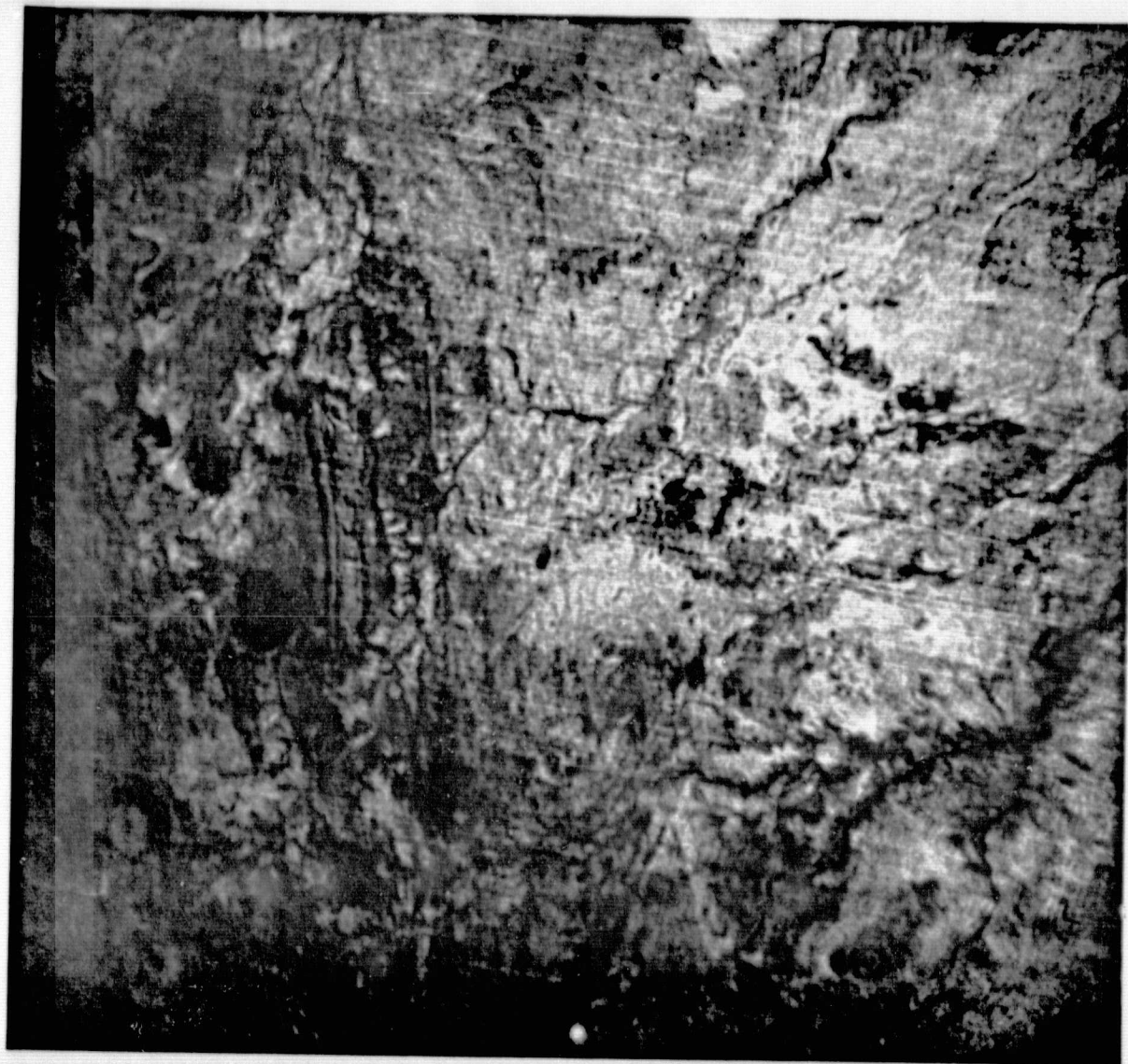


Figure 38

The Dugald River area: Geology interpreted from the colour composite generated from positives of MSS bands 4, 5 and 7 of grid section 21 of LANDSAT 2 imagery: ID 2039-23555: 2 March 1975.

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Figure 39 The Dugald River - Naraku Area. Colour composite generated from MSS bands 4, 5 and 7 of LANDSAT 2 imagery. ID 2183-23552: 24 July 1975.

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Enlarged section grid section 21
interpreted at a scale of 1:50,000

Combination of LANDSAT 2 MSS 4(150)+blue filter
frames imaged on 24th July 1975 MSS 5(161)+green filter
MSS 7(183)+red filter
IDNo. 2183 23552



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Figure 40

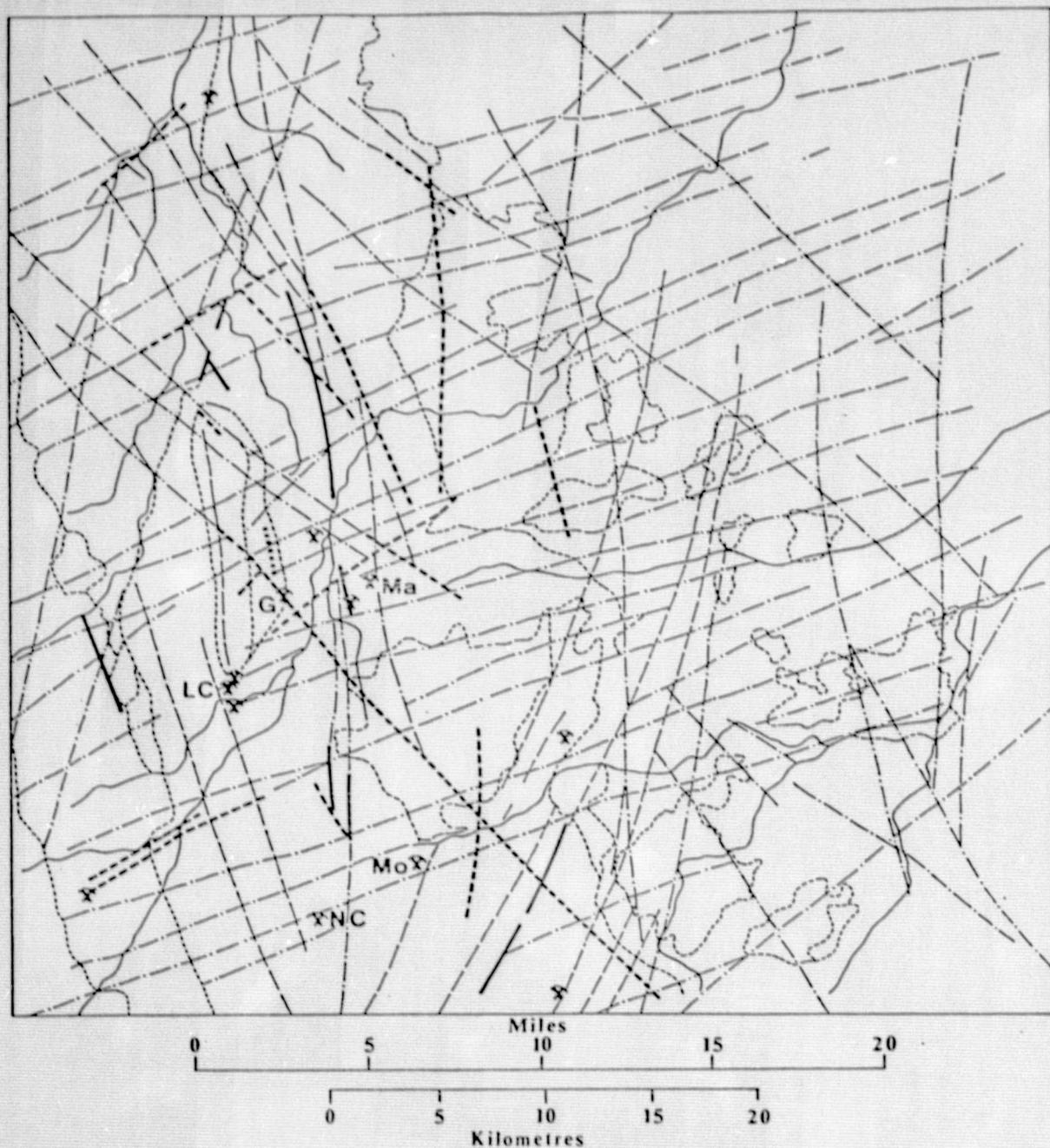
The Dugald River - Naraku area. Spectral signatures recognised on colour composite of MSS bands 4, 5 and 7 of grid section 21 of the Cloncurry - Williams River frame. LANDSAT 2; ID 2183-23552 24 July 1975.

DUGALD RIVER AREA

Structural features interpreted from
a combination of enlarged sections
of LANDSAT 2 bands imaged on
2nd March 1975

I.D. No. 2039 23555

(MSS4 (201) + blue filter
MSS5 (217) + green filter
MSS7 (247) + red filter



- trend lines
- established fault
- - - - - possible fault
- lineament
- geological boundary
- Dugald River lead zinc lode

MINES

- Ma Magnet
- G Godkin
- LC Lady Clayre
- Mo Moonlight
- NC Native Companion

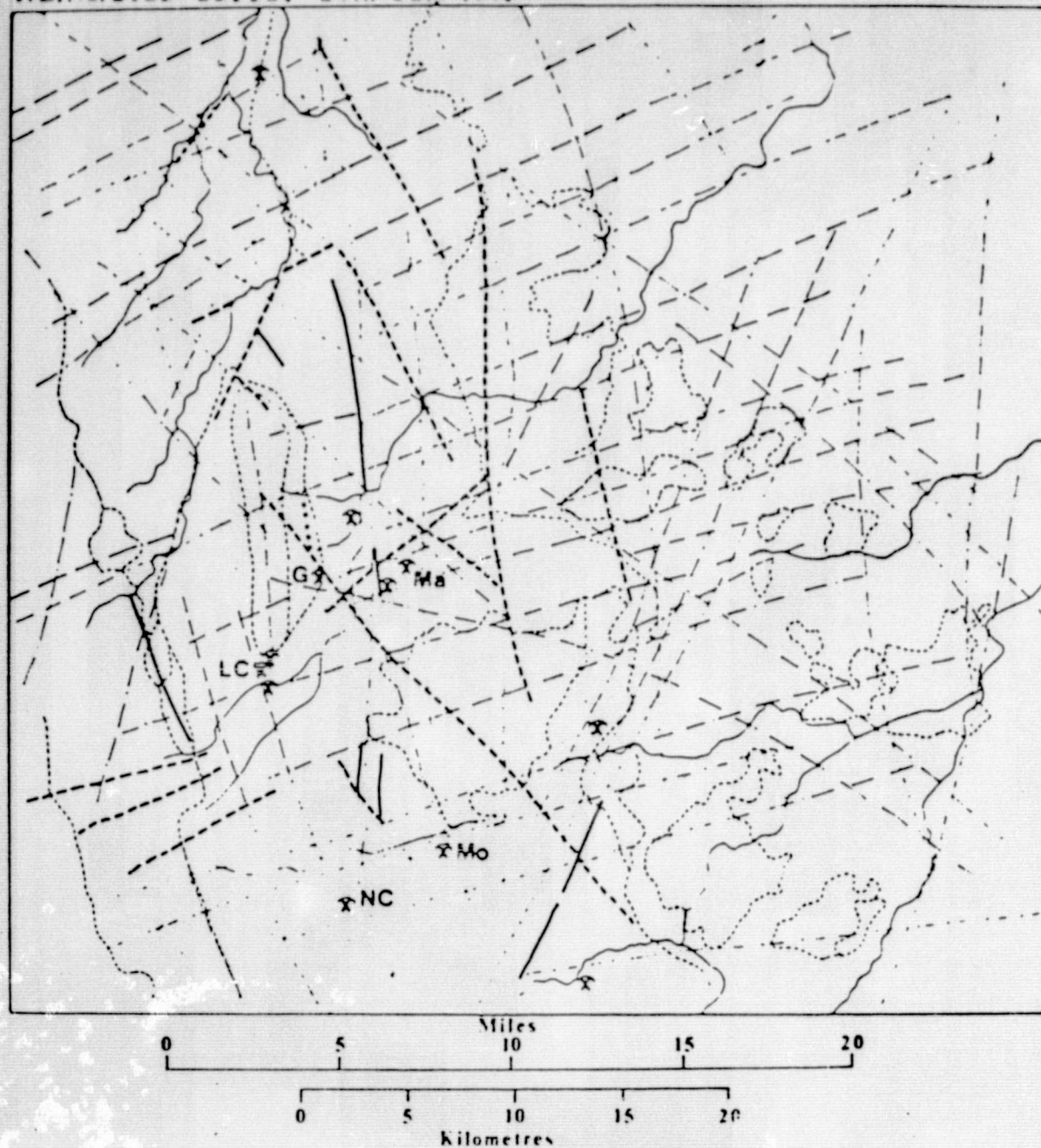
Figure 41

The Dugald River area: Structural features recognised on the colour composite generated from positives of MSS bands 4, 5 and 7 of grid section 21 of LANDSAT 2 imagery:
ID 2039-23555, 2 March 1975

DUGALD RIVER AREA

Structural features interpreted from colour composite of MSS bands 4, 5 and 7 of LANDSAT 2 imagery

I.D.No.2183 23552: 24th July 1975



- trend lines
- established fault
- possible fault
- lineament
- geological boundary
- Dugald River lead zinc lode

MINES

Ma	Magnet
G	Godkin
LC	Lady Clayre
Mo	Moonlight
NC	Native Companion

Figure 42

The Dugald River area: Structural features recognised on the colour composite generated from positives of MSS bands 4, 5 and 7 of grid section 21 of LANDSAT 2 imagery : ID 2183-23552: 24 July 1975.



Figure 43

The Dugald River Lode Area. Colour composite generated from MSS bands 4, 5 and 7 of the CCTs of LANDSAT 2 imagery ID 2039-23555: 2 March 1975.

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CCT image resolution 1x1pixel Combination of LANDSAT 2 bands Band4+blue filter
 interpreted at a scale of 1:9,600 imaged on 2nd March 1975 Band5+green filter
 Job 17/027 I.D.No. 2039 23555 Band7+red filter

CCT image resolution 1x1pixel Combination of LANDSAT 2 bands Band4+blue filter
 interpreted at a scale of 1:9,600 imaged on 2nd March 1975 Band5+green filter
 Job 17/027 I.D.No. 2039 23555 Band7+red filter

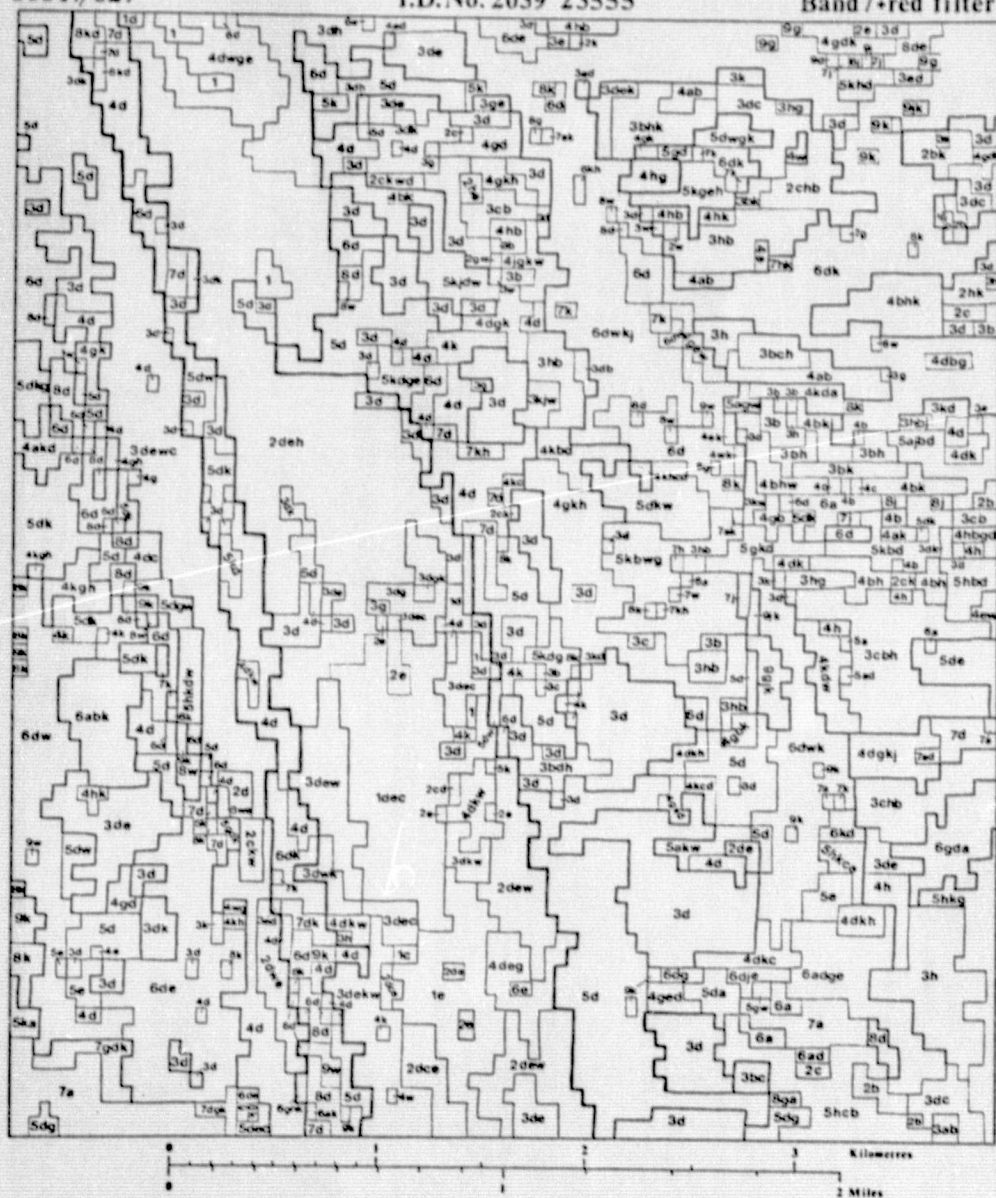


Figure 44 The Dugald River Lode area. Spectral signatures recognised on the colour composite generated from MSS bands 4, 5 and 7 of the computer compatible tapes of LANDSAT 2 imagery. ID 2039-23555
2 March 1975

THE DUGALD RIVER LODE AREA-GEOLOGY

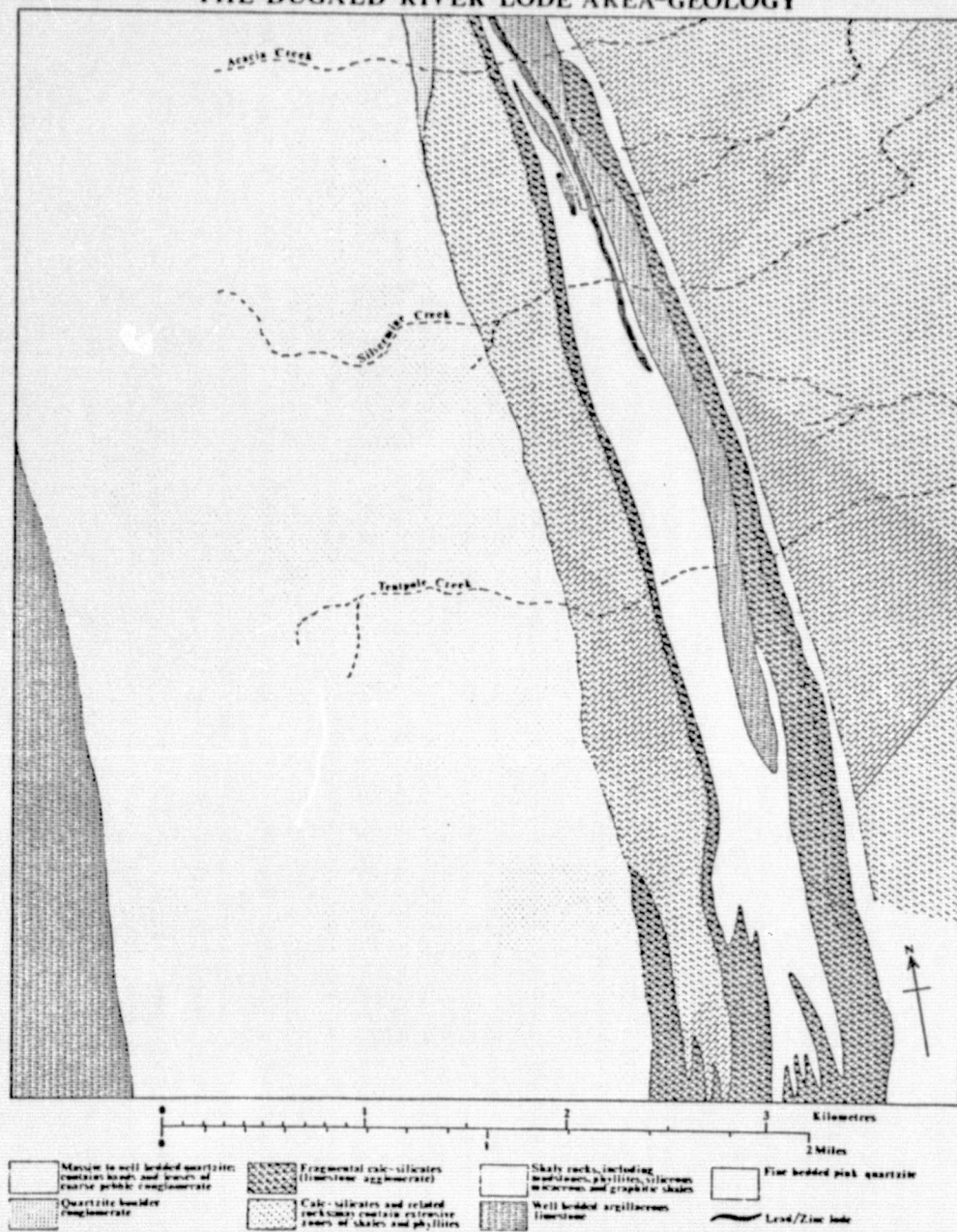


Figure 45 The Dugald River Lode area. Geology after the mapping of Conzinc-Riotinto of Australia Ltd.

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LADY ANNIE-PARADISE-CREEK MT. GORDON FAULT ZONE AREA GEOLOGY

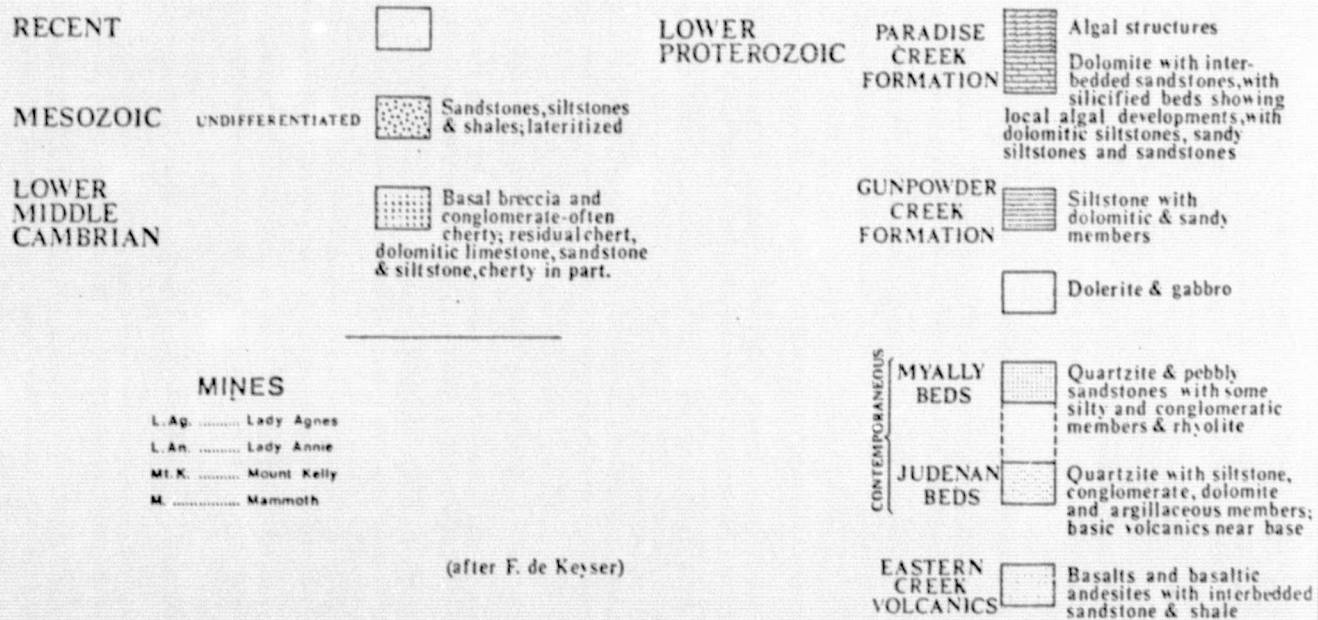


Figure 46

Lady Annie - Mt Gordon fault zone. Geology. (After de Keyser 1958)



Figure 47

The Lady Annie Area. Colour composite generated from MSS bands 4, 5 and 7 of LANDSAT 2 imagery covering grid section 23 of the Lady Annie- Mount Isa frame. LANDSAT 2 : ID 2292-23594: 10 November 1975.

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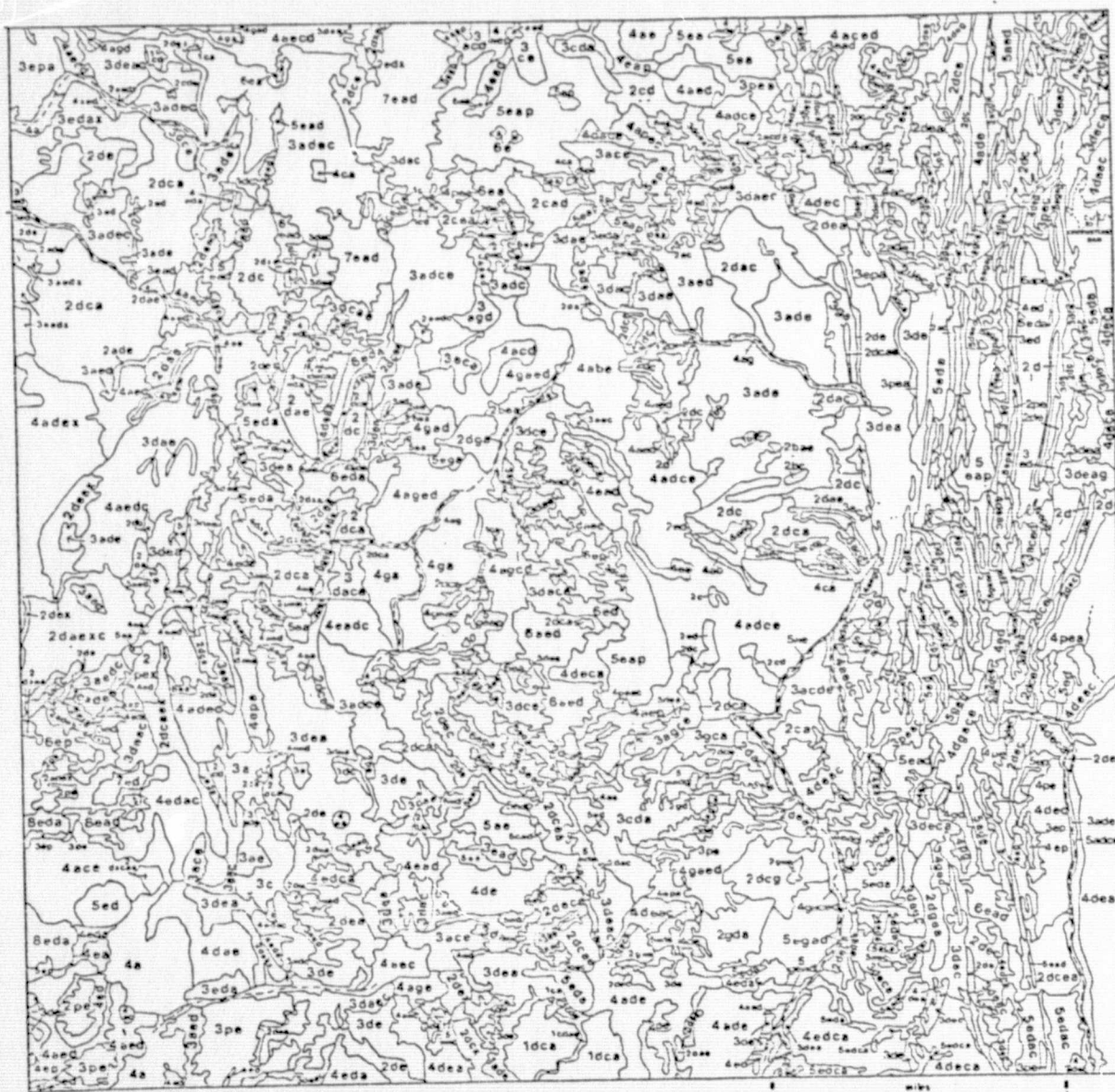
Figure 48

The Lady Annie Area. Colour composite generated from MSS bands 4, 5 and 7 of LANDSAT 2 imagery covering grid section 23 of the Gregory River - Mount Isa frame. LANDSAT 2 : ID 2059-00012: 22 March 1975.

Enlarged section (grid section 23)
interpreted at a scale of 1:48,000

Combination of LANDSAT 2 frames imaged on 22nd March, 1975
I.D.No. 2059-00012

MSS 4(094) + blue filter
MSS 5(110) + green filter
MSS 7(142) + red filter



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Figure 49

Lady Annie-Mount Gordon fault zone area: spectral signatures recognised on the colour composite generated from positives of MSS bands 4, 5 and 7 of grid section 23 of LANDSAT 2 imagery: ID 2059-00012: 22 March 1975.

LADY ANNIE Mt.GORDON FAULT ZONE AREA

Geology interpreted from a combination of enlarged sections of LANDSAT 2 bands imaged on 22nd March 1975

MSS 4(094)+ blue filter
MSS 5(110)+ green filter
MSS 7(142)+ red filter

IDNo 2059 00012

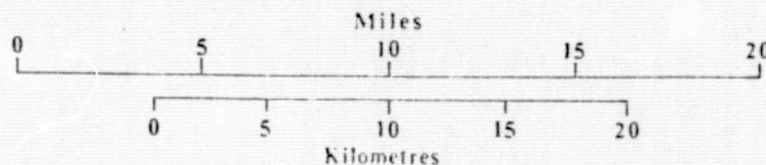
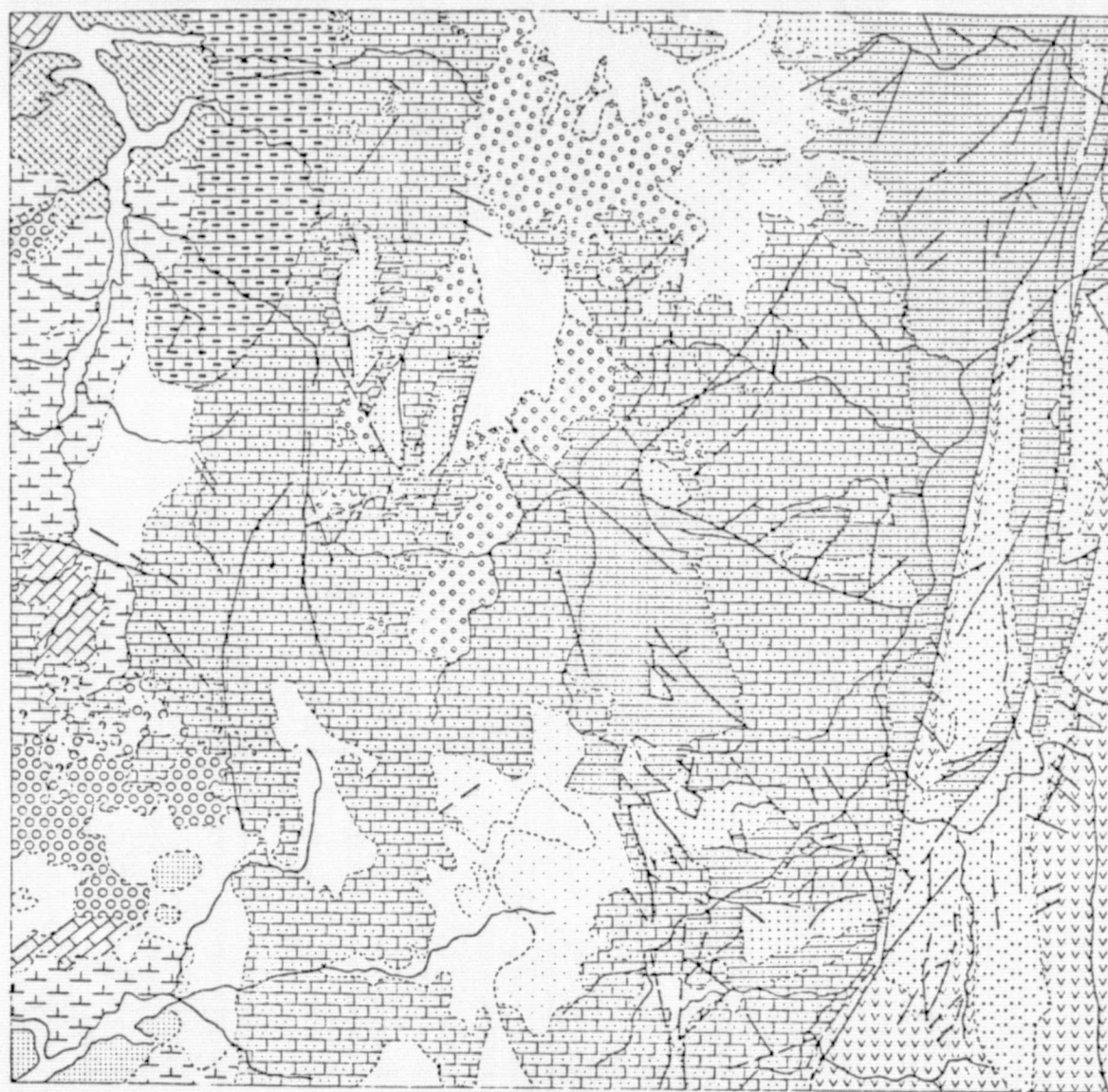
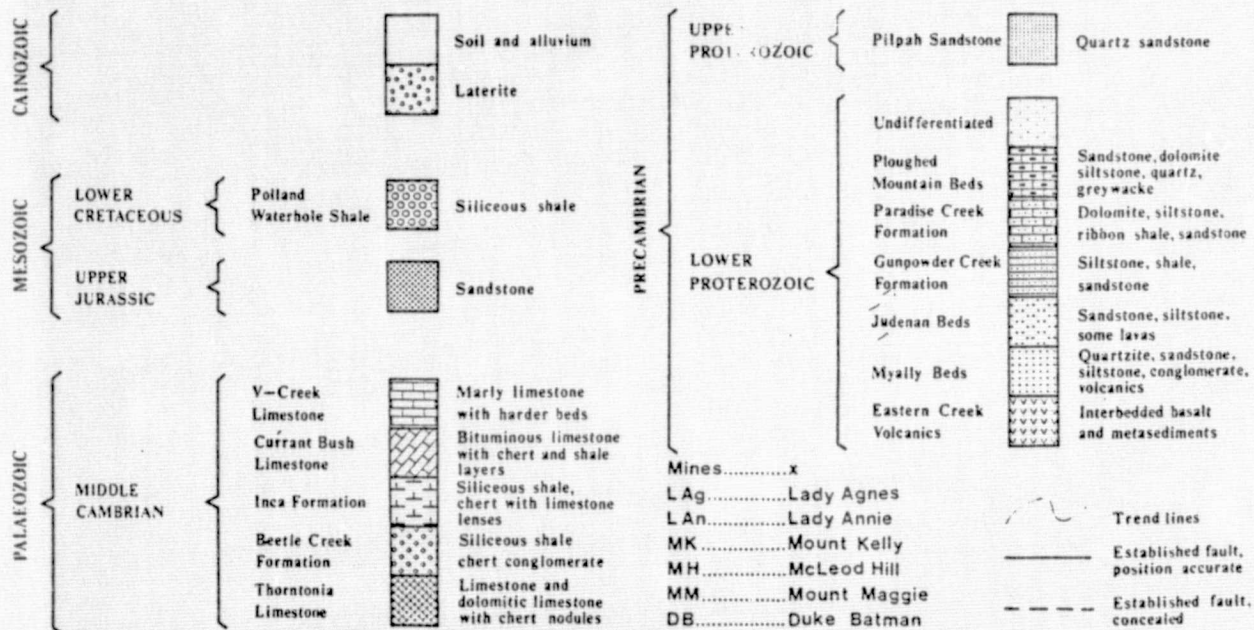


Figure 50

Lady Annie-Mount Gordon fault zone area: Geology interpreted from the colour composite generated from positives of MSS bands 4, 5 and 7 of grid section 23 of LANDSAT 2 imagery: ID 2059-00012 : 22 March 1975.

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LADY ANNIE — Mt. GORDON FAULT ZONE AREA
GEOLOGY (after the Bureau of Mineral Resources
1:253,440 Map, Camooweal sheet 1961)

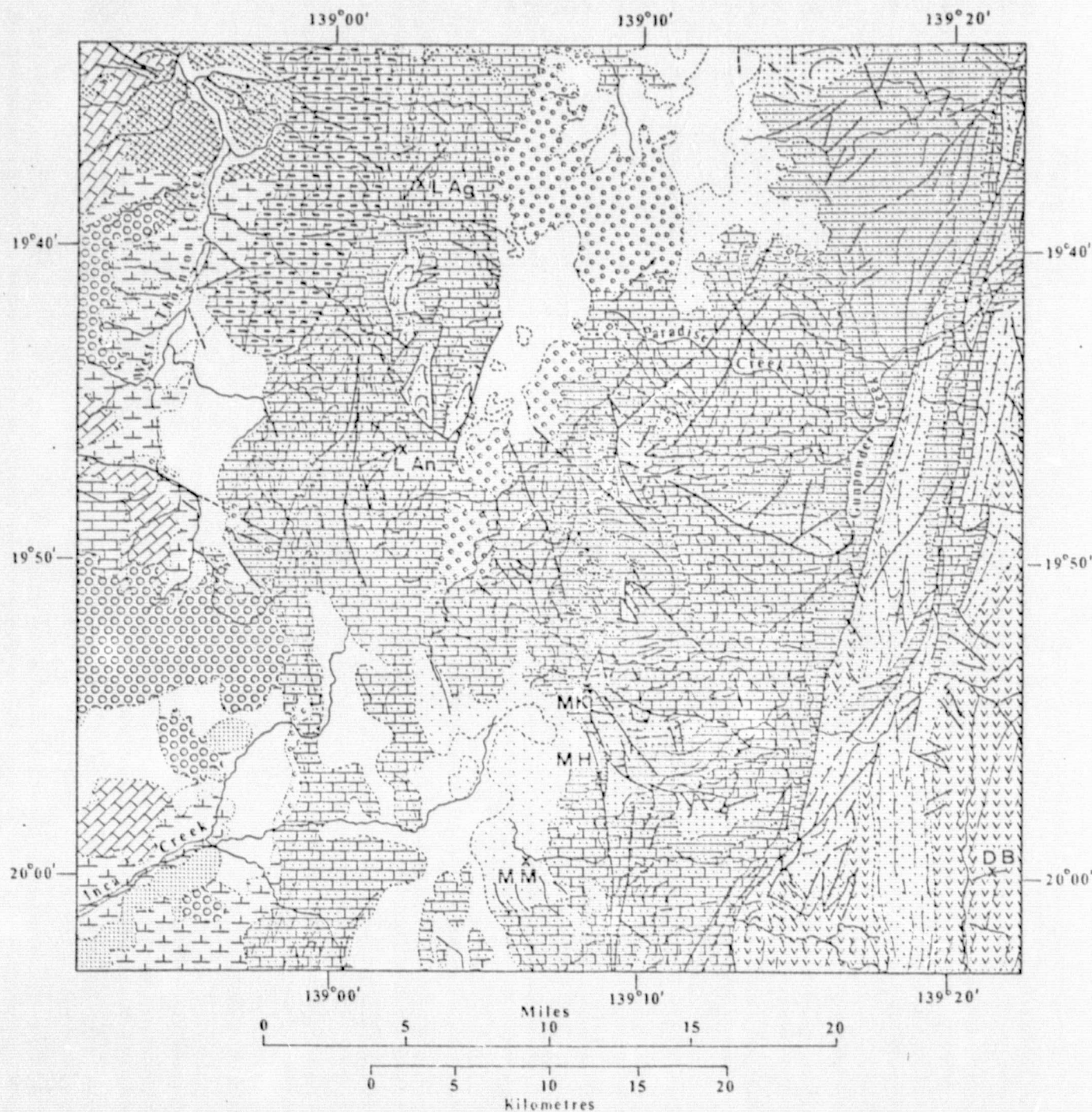


Figure 51

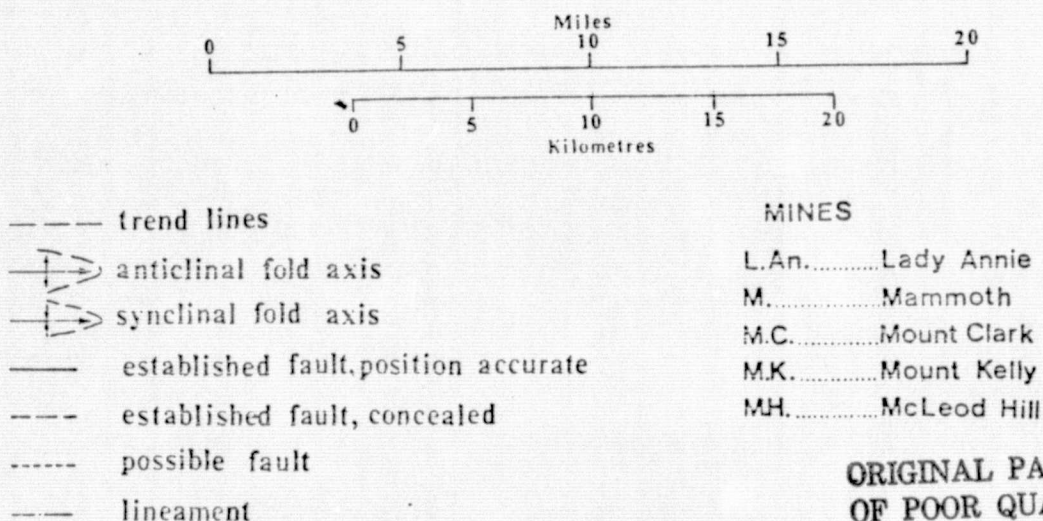
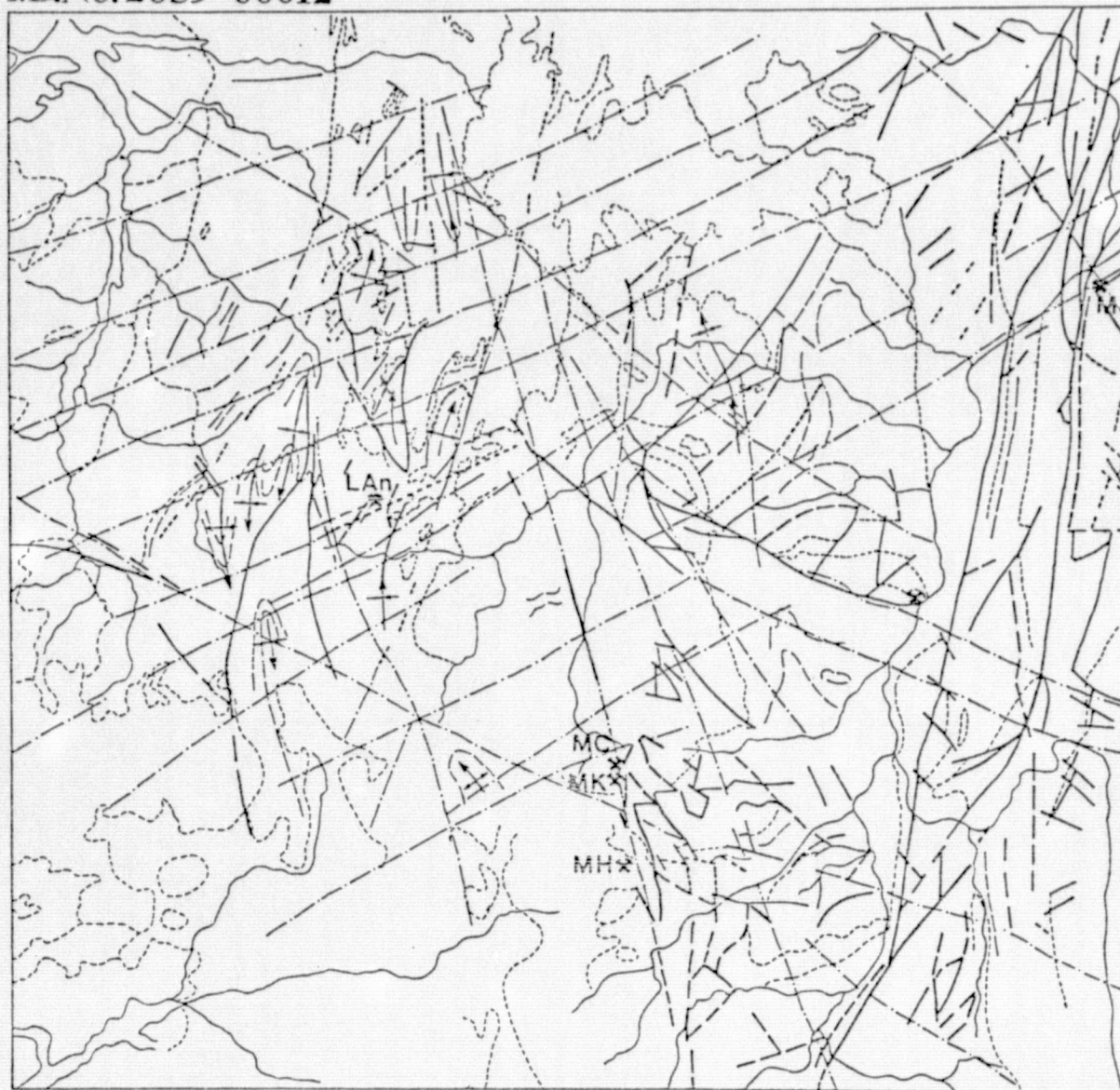
Lady Annie - Paradise Creek - Mount Gordon Fault Zone Area:
geology after Bureau of Mineral Resources 1:253,440
geological series, Camooweal sheet E54-13.

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LADY ANNIE-Mt.GORDON FAULT ZONE AREA

Structural features interpreted from a combination of enlarged sections of LANDSAT 2 bands imaged on 22nd March 1975

ID.No.2059 00012

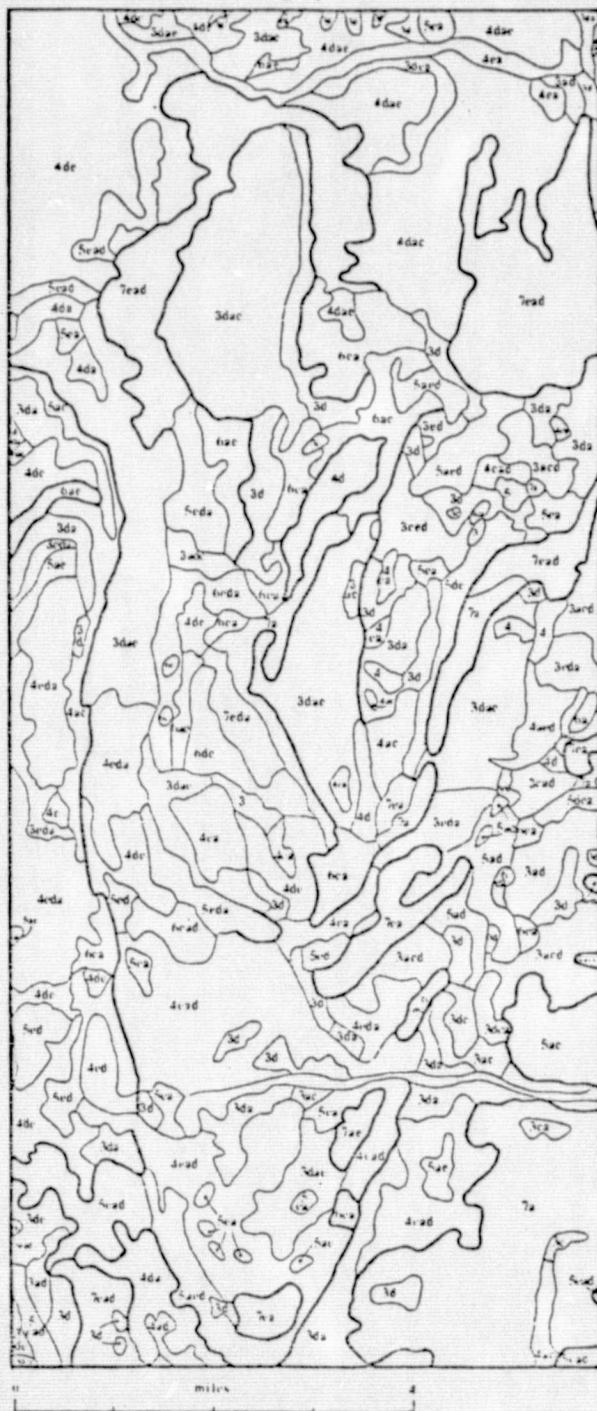


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Figure 52

Lady Annie-Mount Fordon fault zone area: structural features interpreted from the colour composite generated from positives of MSS bands 4, 5 and 7 of grid section 23 of LANDSAT 2 imagery: ID 2059-00012: 22 March 1975.

Enlarged section of imagery taken on 15th Feb. 1973



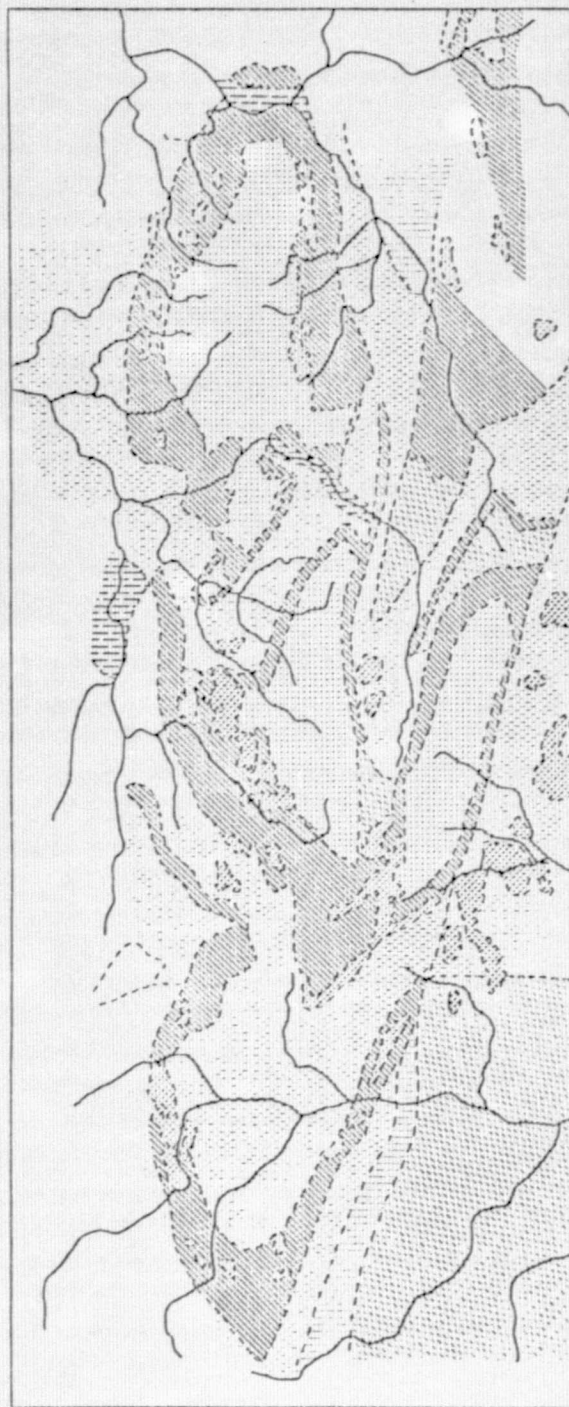
Spectral signatures recognised by visual interpretation

Figure 53

The Lady Annie - Lady Loretta area. Spectral signatures recognised on the colour composite of MSS bands 4, 5 and 7 of a section of the Mount Isa-Gregory River frame. LANDSAT I ID1207-00133
15 February 1973.

Figure 54 The Lady Annie - Lady Loretta area. Vegetation.

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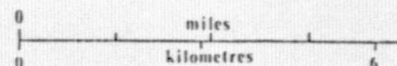
THE LADY ANNIE AREA VEGETATION

LOW TREE AND SHRUB SAVANNA

-  Typical low tree and shrub savanna dominated by *Eucalyptus brevifolia* trees and *Triodia pungens* grass with patches of *Sporobolus australasicus* grass and much bare ground
-  Low tree and shrub savanna dominated by *Eucalyptus brevifolia* trees and *Triodia pungens* grass with patches of *Sporobolus australasicus*, and *Cenchrus*, *Heteropogon* and *Chrysopogon* spp. grasses
-  Low tree and shrub savanna of *Eucalyptus terminalis*, *E. arillacea*, *E. brevifolia*, *E. pruinosa* and *Bauhinia* spp. trees and *Enneapogon brachystachys*, *Sporobolus australasicus*, *Heteropogon contortus* and *Cenchrus* spp. grasses
-  Very open low tree and shrub savanna dominated by *Triodia pungens* grass with widely spaced *Eucalyptus brevifolia* trees on skeletal sandy soils on level plateaux over Myally quartzites
-  Low tree and shrub savanna dominated by *Eucalyptus brevifolia* trees and *Triodia pungens* grass and scattered stands of *Acacia shirleyi* trees

SAVANNA SCRUB WOODLAND

-  Monospecific communities of *Acacia shirleyi* trees on laterite and lateritized surfaces. Ground layer usually absent
-  Scrub woodland dominated by *Acacia shirleyi* trees with some *Sporobolus australasicus* and *Eriachne* spp. grasses and much bare ground on ferruginous gravel and on the slopes below the laterite capped hills. Local patches of *Eucalyptus brevifolia* trees and *Triodia pungens* grass





LADY ANNIE/LADY LORETTA AREA: GEOLOGY

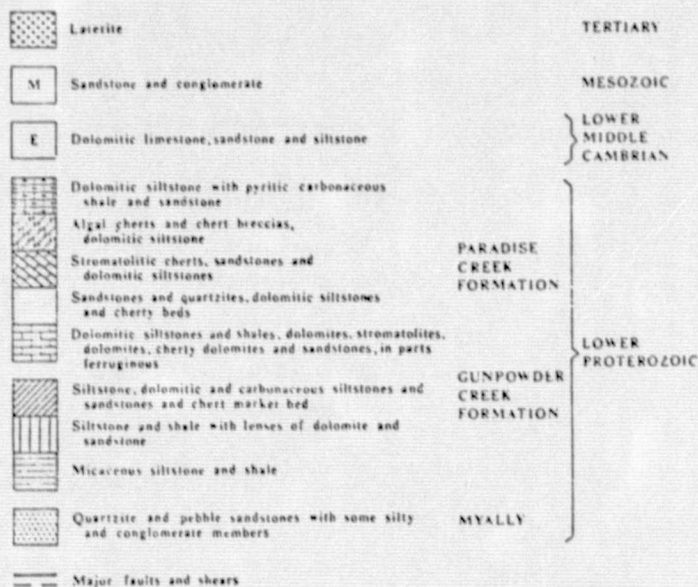


Figure 55

The Lady Annie - Lady Loretta area. Geology
(After de Keyser, modified by Alcock, Grayton,
Dowling and Lee).



Figure 56

The Lady Annie - Lady Loretta Area. Colour composite generated from MSS bands 4, 5 and 7 of the CCT's of LANDSAT 2 imagery: ID 2059-00012: 22 March 1975.

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Band 7+red filter

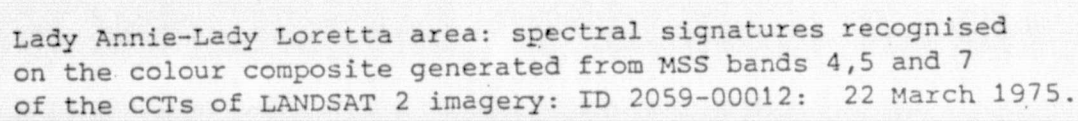


Figure 58

The Lady Annie - Lady Loretta Area: geology interpreted from the colour composite generated from MSS bands 4, 5 and 7 of the CCTs of LANDSAT 2 imagery: ID 2059-00012: 22 March 1975.

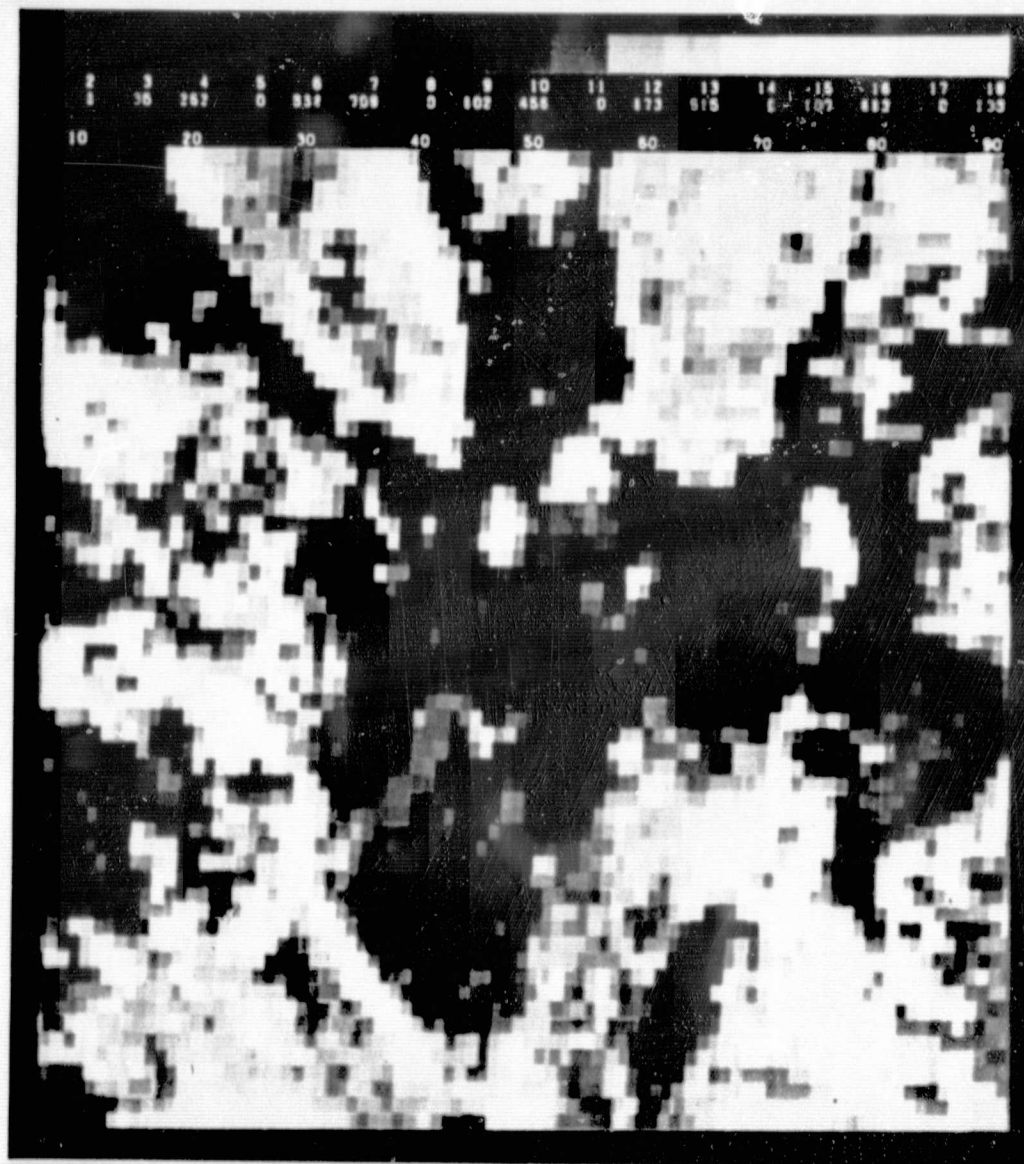


Figure 59

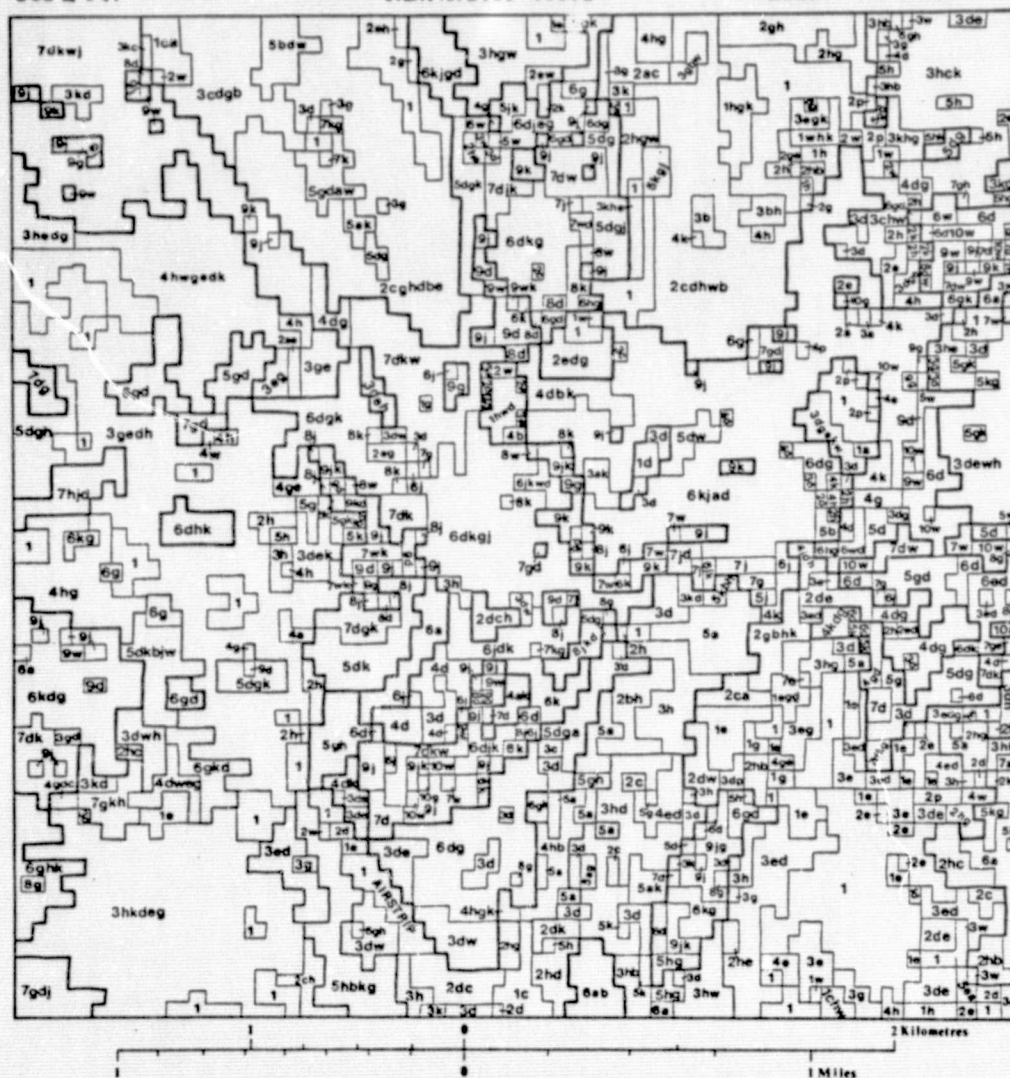
The Lady Loretta Area. Colour composite generated from MSS bands 4, 5 and 7 of the CCTs of LANDSAT 2 imagery covering the Big Syncline and Small Syncline area. LANDSAT 2: ID 2059-00012: 22 March 1975.

CCT image resolution 1x1 pixel	Combination of LANDSAT 2 bands	Band 4 - blue filter
interpreted at a scale of 1:10,000	imaged on 22nd March 1975	Band 5 - green filter
Job 2/047	I.D.No. 2059 00012	Band 7 - red filter

CCT image resolution 1x1 pixel
interpreted at a scale of 1:10,000
Job 2/047

Combination of LANDSAT 2 bands
imaged on 22nd March 1975
I.D.No. 2059 00012

Band 4 + blue filter
Band 5 + green filter
Band 7 + red filter



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Figure 60 The Lady Loretta area. Spectral signatures recognised on the colour composite generated from MSS bands 4, 5 and 7 of the computer compatible tapes of LANDSAT 2 imagery: ID 2059-00012: 22 March 1975

LADY LORETTA: Geological Interpretation from CCT

CCT image resolution 1x1 pixel
 interpreted at a scale of 1:10,000
 Job 2/047

Combination of LANDSAT 2 bands
 imaged on 22nd March 1975
 I.D.No. 2059 00012

Band 4 + blue filter
 Band 5 + green filter
 Band 7 + red filter

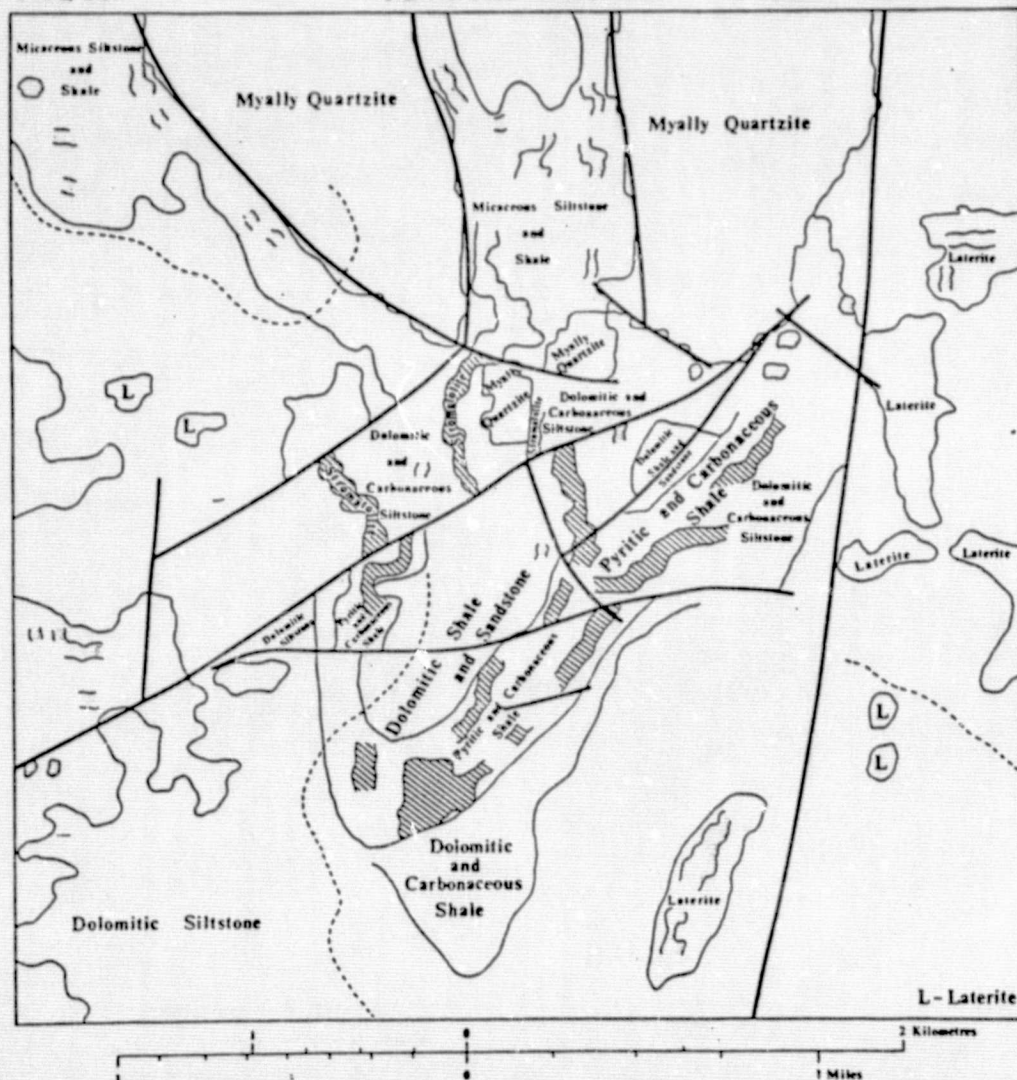
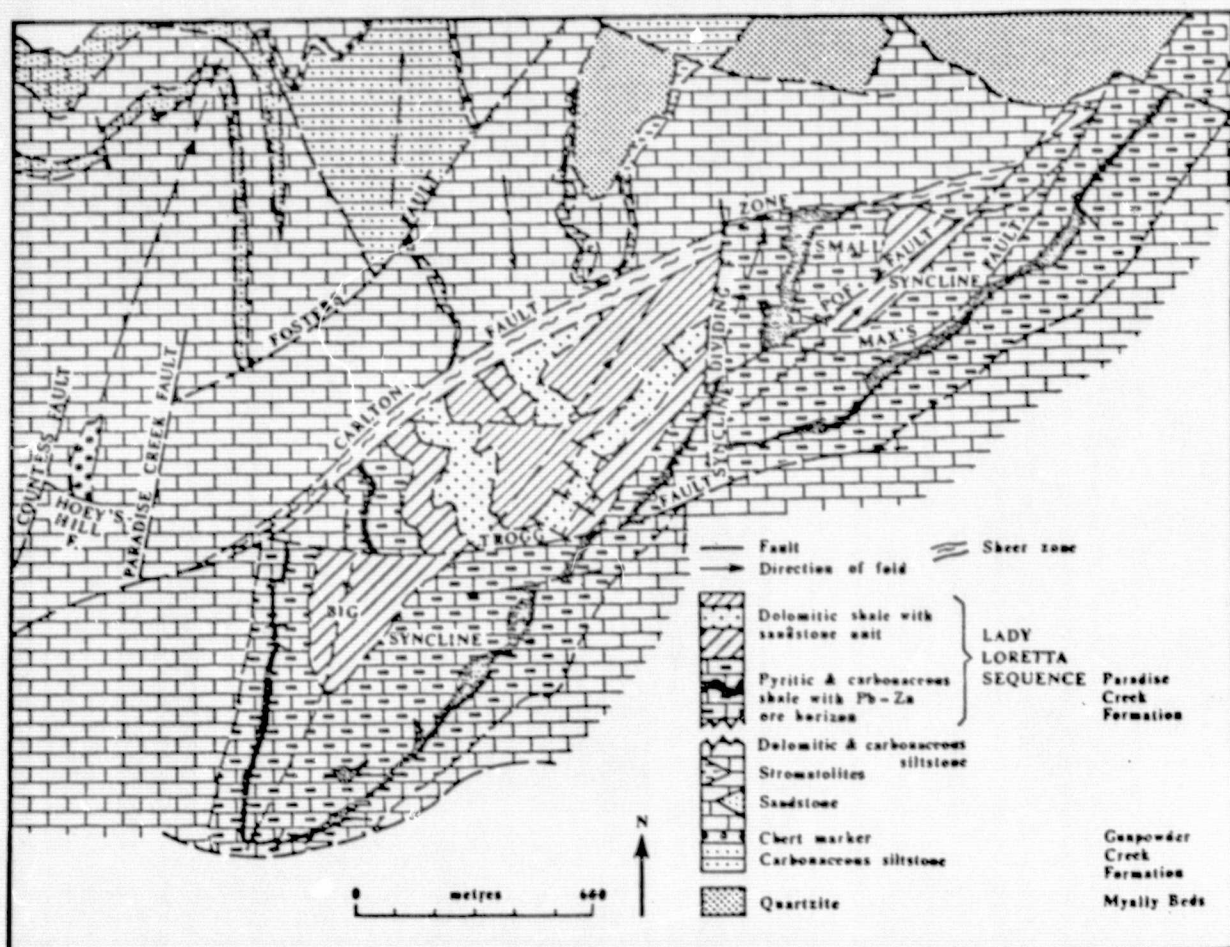


Figure 61 The Lady Loretta area. Geological interpretation of the colour composite generated from MSS bands 4,5 and 7 of the computer compatible tapes of the LANDSAT 2 imagery.
 ID 2059=00012: 22 March 1975



LADY LORETTA - GEOLOGY

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Figure 62 The Lady Loretta area. Geology. (after Alcock and Lee)



Figure 63

The Lady Annie Area. Colour composite generated from MSS bands 4, 5 and 7 of the CCTs of LANDSAT 2 imagery covering the northwestern plateau block of Myally quartzite north of Lady Annie. LANDSAT 2 : ID 2059-00012: 22 March 1975.

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LADY ANNIE: Multispectral Signatures

CCT image resolution 1x1 pixel
interpreted at a scale of approx. 1:10,000
Job 3/047

Combination of LANDSAT 2 bands
imaged on 22nd March 1975
I.D. No. 2059 00012

Band 4 + blue filter
Band 5 + green filter
Band 7 + red filter

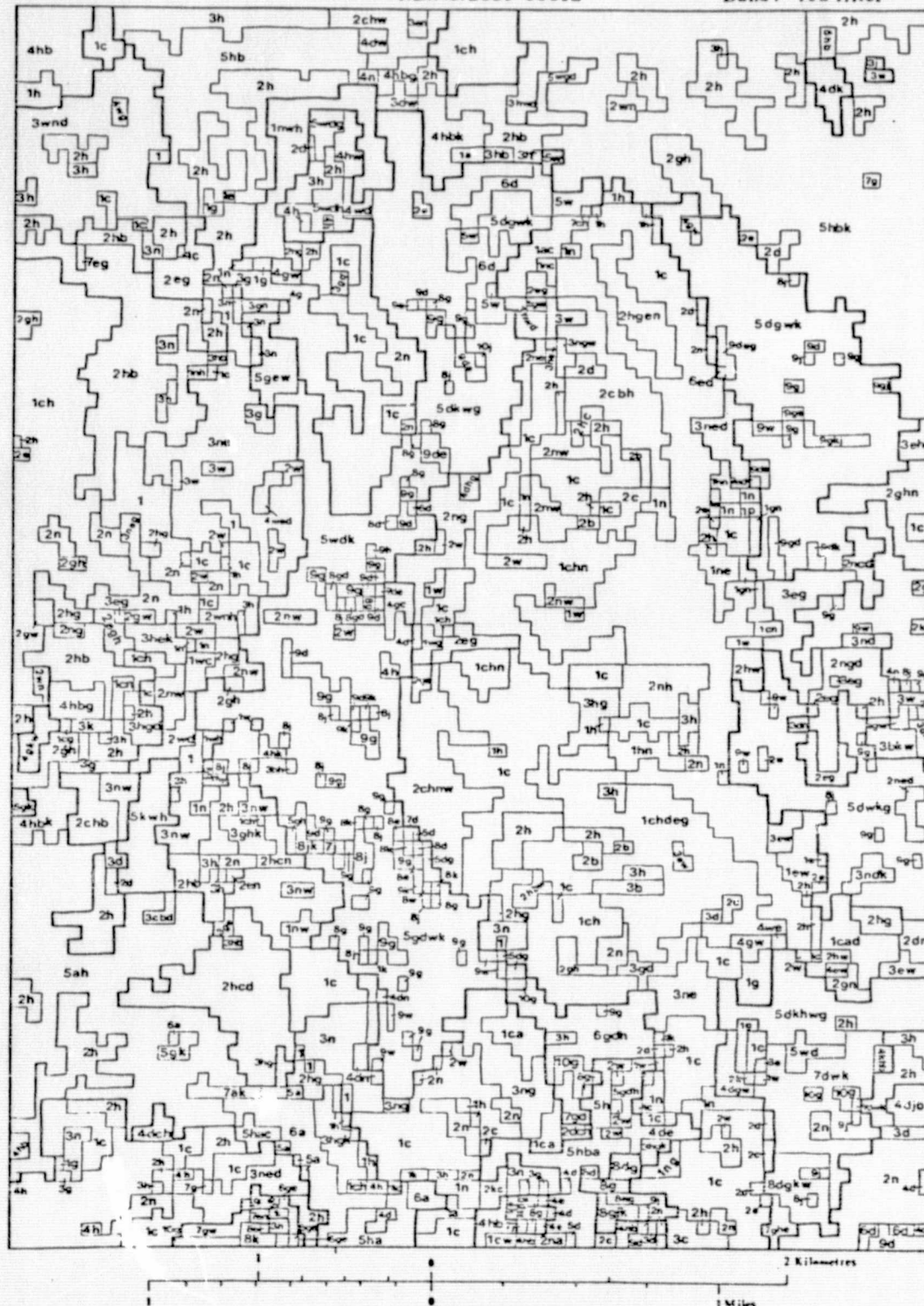


Figure 64

The Lady Annie Area. Spectral signatures recognised on the colour composite generated from MSS bands 4, 5 and 7 of the CCTs of LANDSAT 2 imagery covering the northwestern plateau block of Myally quartzite north of Lady Annie. LANDSAT 2: ID 2059-00012: 22 March 1975.

MOUNT KELLY: Multispectral Signatures

CCT image resolution 1x1 pixel
interpreted at a scale of 1:44,000
Job 12/027

Combination of LANDSAT 2 bands
imaged on 22nd March 1975
I.D.No. 2059 00012

Band 4+blue filter
Band 5+green filter
Band 7+red filter



Figure 65

Mount Kelly area: spectral signatures recognised on the colour composite generated from MSS bands 4,5 and 7 of the CCTs of LANDSAT 2 imagery : ID 2059-00012: 22 March 1975

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Figure 66

The Mount Kelly Area : geology interpreted from the colour composite generated from MSS bands 4, 5 and 7 of the CCTs of LANDSAT 2 imagery: ID 2059-00012 : 22 March 1975.

MOUNT KELLY:

CCT image resolution 1.1 pixel
 interpreted at a scale of 1:44,000
 Job 12/027

Combination of LANDSAT 2 bands
 imaged on 3rd March 1975
 I.D.No. 2059 00012

Band 4+blue filter
 Band 5+green filter
 Band 7+red filter

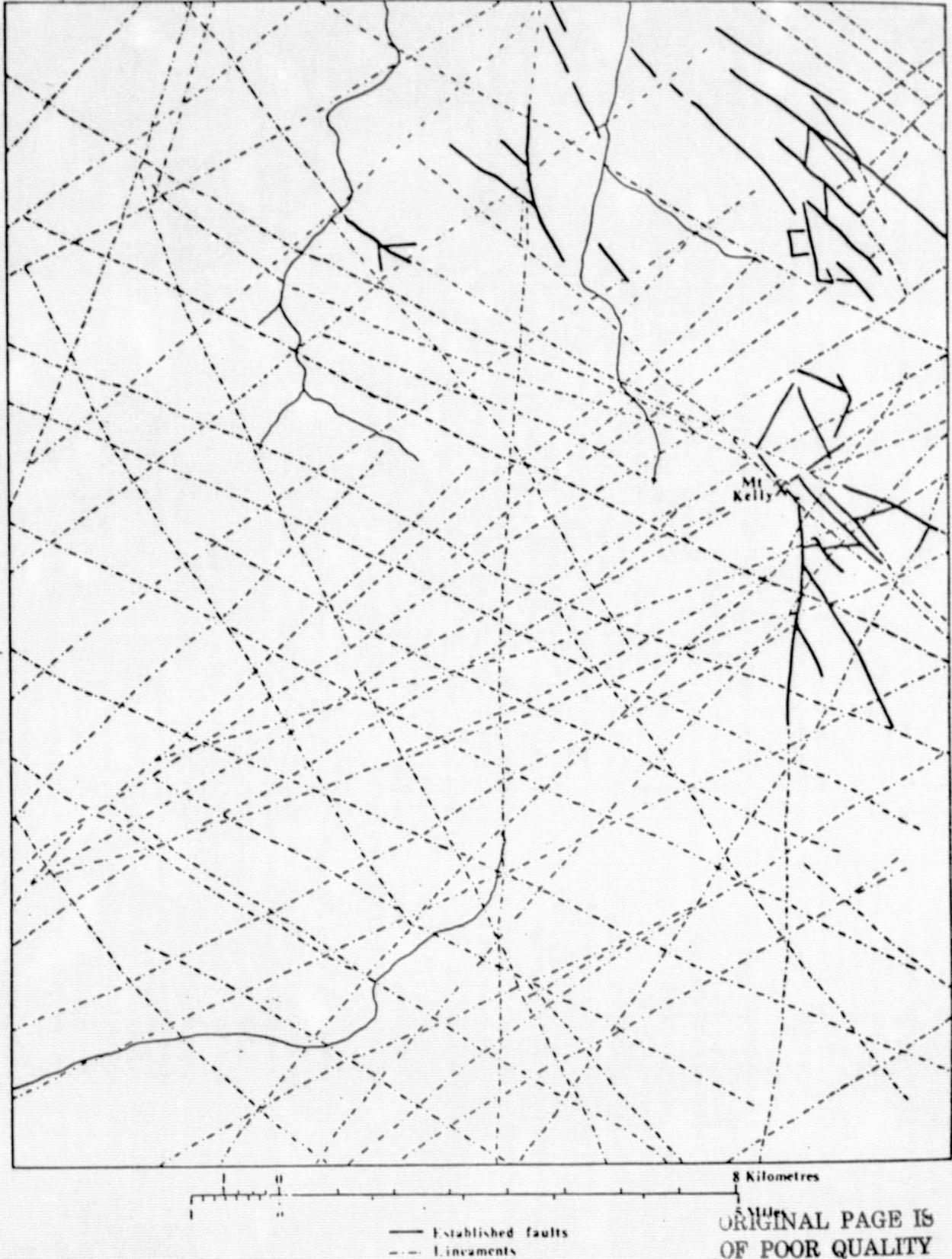


Figure 67

Mount Kelly area: Structural features interpreted from the colour composite generated from MSS bands 4, 5 and 7 of the CCTs of LANDSAT 2 imagery : ID 2059-00012: 22 March 1975



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Figure 68

The Cloncurry Plains. Colour composite generated from positives of MSS bands 4, 5 and 7 of LANDSAT 1 imagery covering grid section 22 of the Cloncurry-Dobbyn frame. LANDSAT 1 : ID 1151-00073: 22 December 1972.

CLONCURRY PLAINS - LOCATION MAP

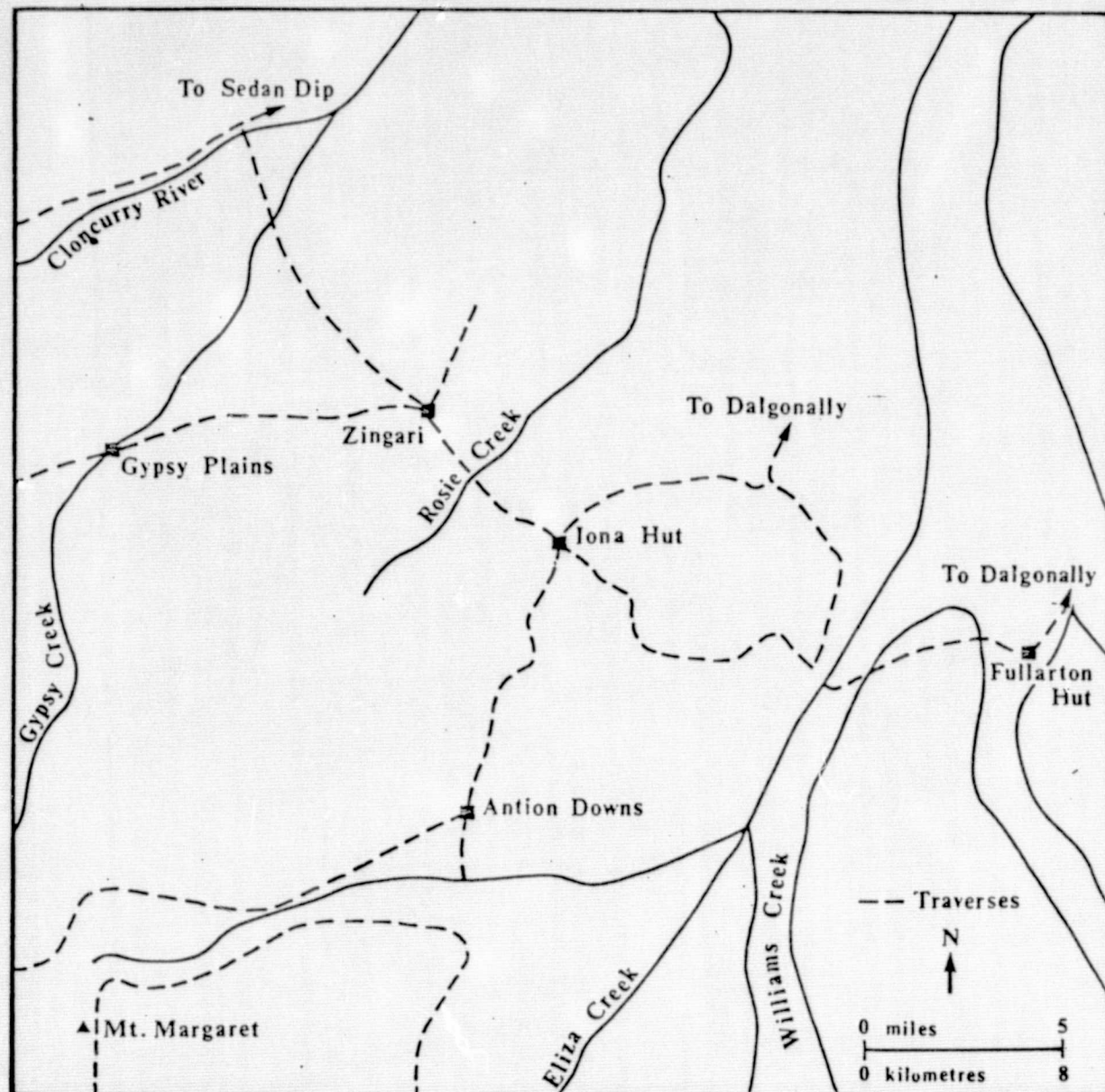


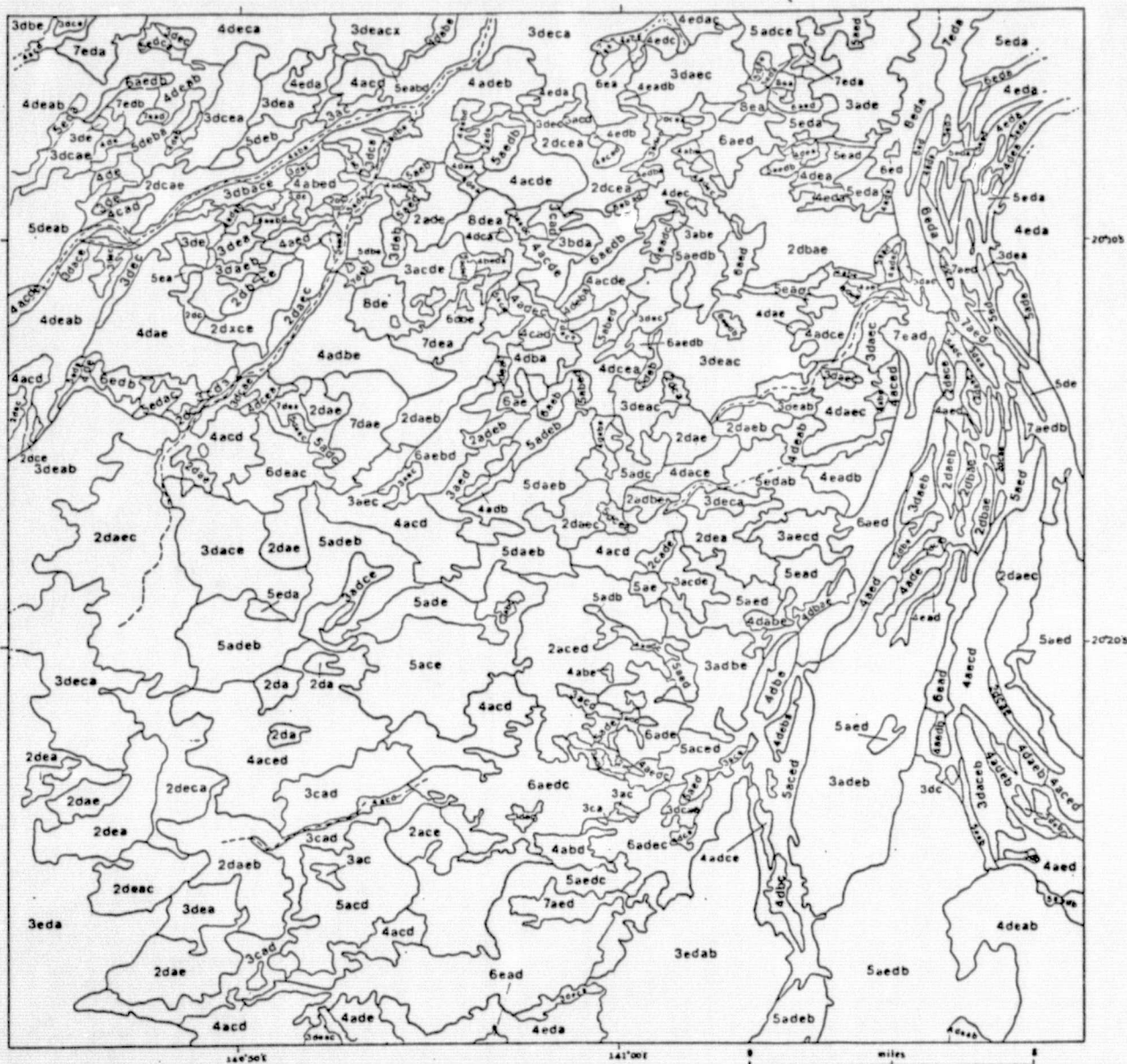
Figure 69 The Cloncurry Plains. Location map.

THE CLONCURRY PLAINS: Multispectral signatures

Enlarged section(grid section 22)
interpreted 1:50,000

Combination of LANDSAT 1
frames imaged on 22nd Dec.1972
I.D.No. 1152 00073

MSS 4 (096) + blue filter
MSS 5 (127) + green filter
MSS 7 (189) + red filter



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Figure 70

The Cloncurry Plains. Spectral signatures recognised on the colour composite of MSS bands 4, 5 and 7 of grid section 22 of the Cloncurry-Dobbyn frame.

LANDSAT I ID1152-00073: 22 December 1972.



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Figure 71 The Cloncurry Plains. Colour composite generated from positives of MSS bands 4, 5 and 7 of LANDSAT 2 imagery covering grid section 22 of the Cloncurry- Dobbryn frame. LANDSAT 2: ID 2039-23555: 2 March 1975.

THE CLONCURRY PLAINS: Multispectral signatures

Enlarged section(grid section 22)
interpreted at a scale of 1:50,000

Combination of LANDSAT2
frames imaged on 2nd March 1975.
I.D.No. 2039 23555

MSS 4 (201)+blue filter
MSS 5 (217)+green filter
MSS 7 (249)+red filter

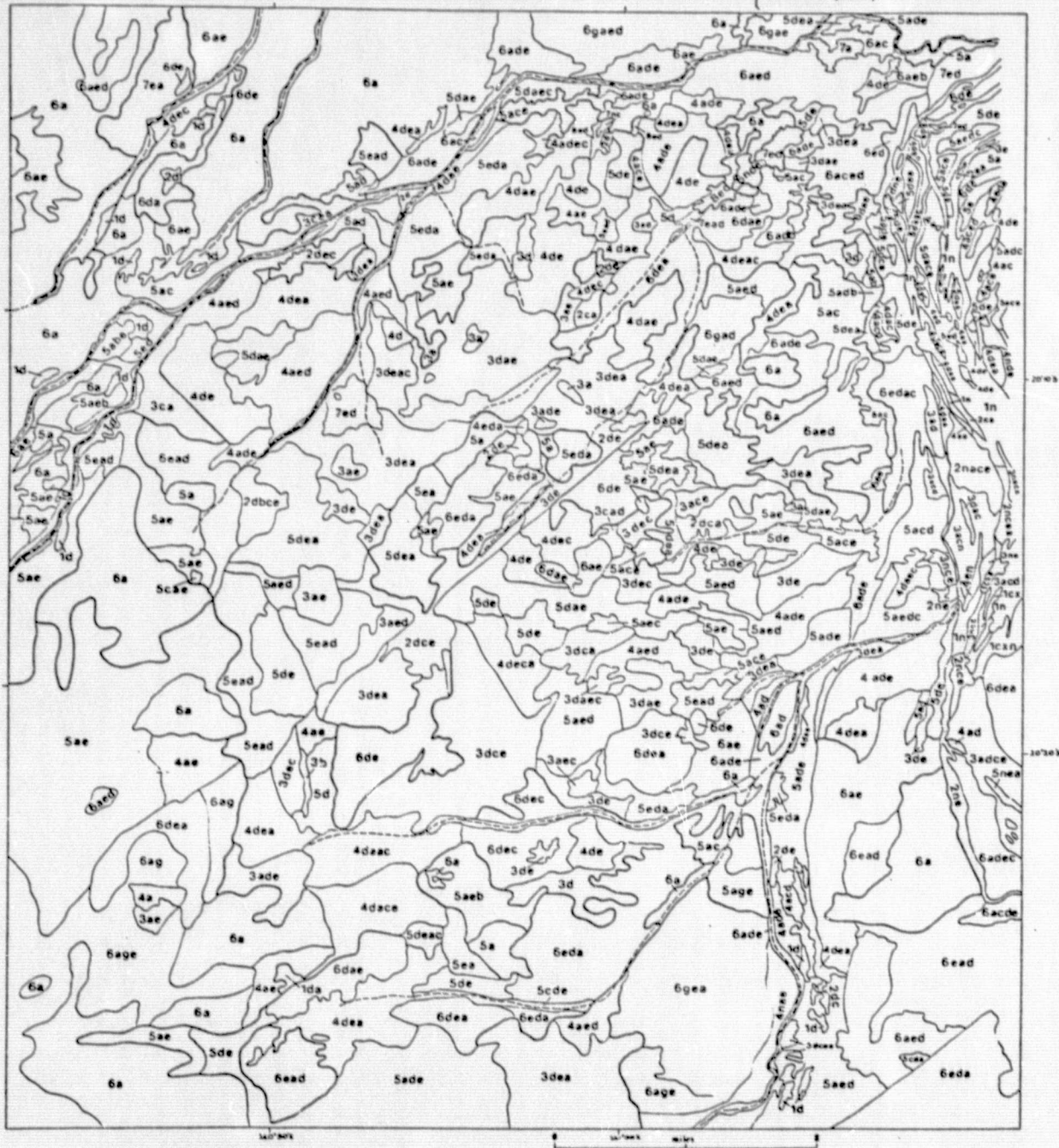
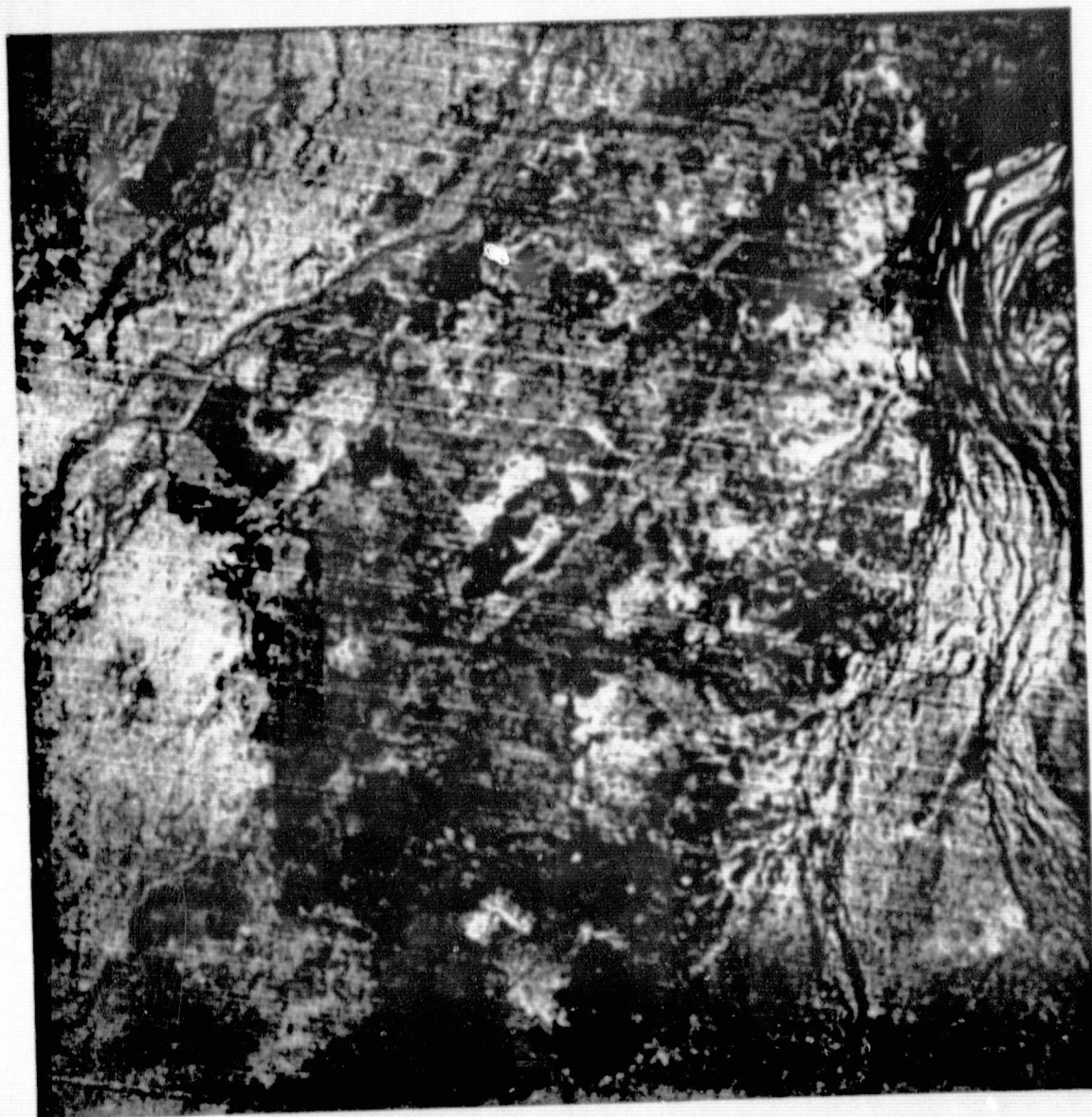


Figure 72

The Cloncurry Plains: Spectral signatures recognised on the colour composite generated from positives of MSS bands 4, 5 and 7 of grid section 22 of LANDSAT 2 imagery: ID 2039-23555: 2 March 1975.



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Figure 73

The Cloncurry Plains. Colour composite generated from positives of MSS bands 4, 5 and 7 of LANDSAT 2 imagery covering grid section 21 of the Cloncurry-Dobbyn frame. LANDSAT 2 : ID 2183-23552: 24 July 1975.

THE CLONCURRY PLAINS: Multispectral signatures

Enlarged section (grid section 22)
interpreted at a scale of 1:50,000

Combination of LANDSAT
frames imaged on 24th July 1975
I.D.No. 2183 23552

MSS4(150)+blue filter
MSS5(161)+green filter
MSS7(183)+red filter

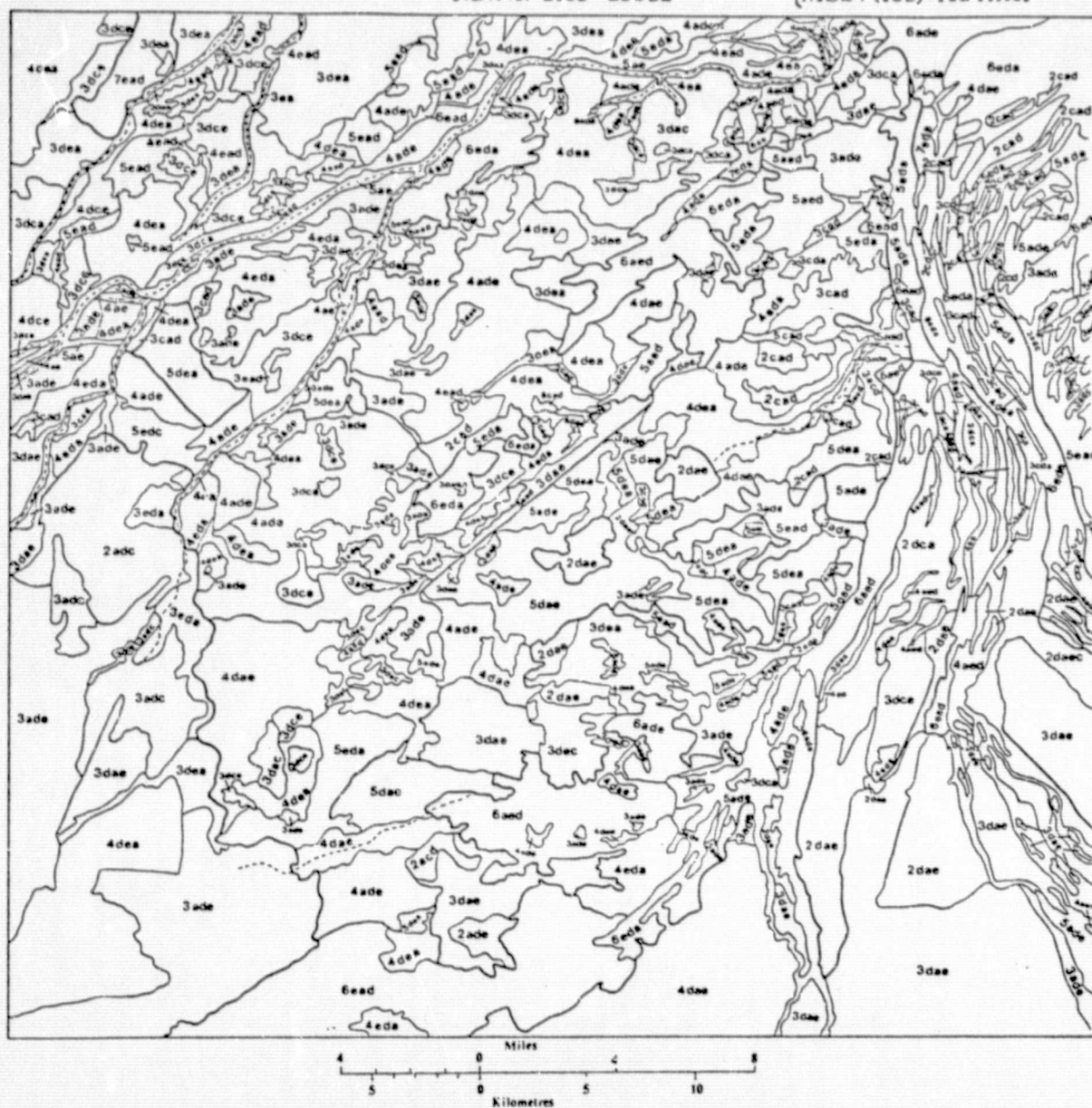


Figure 74

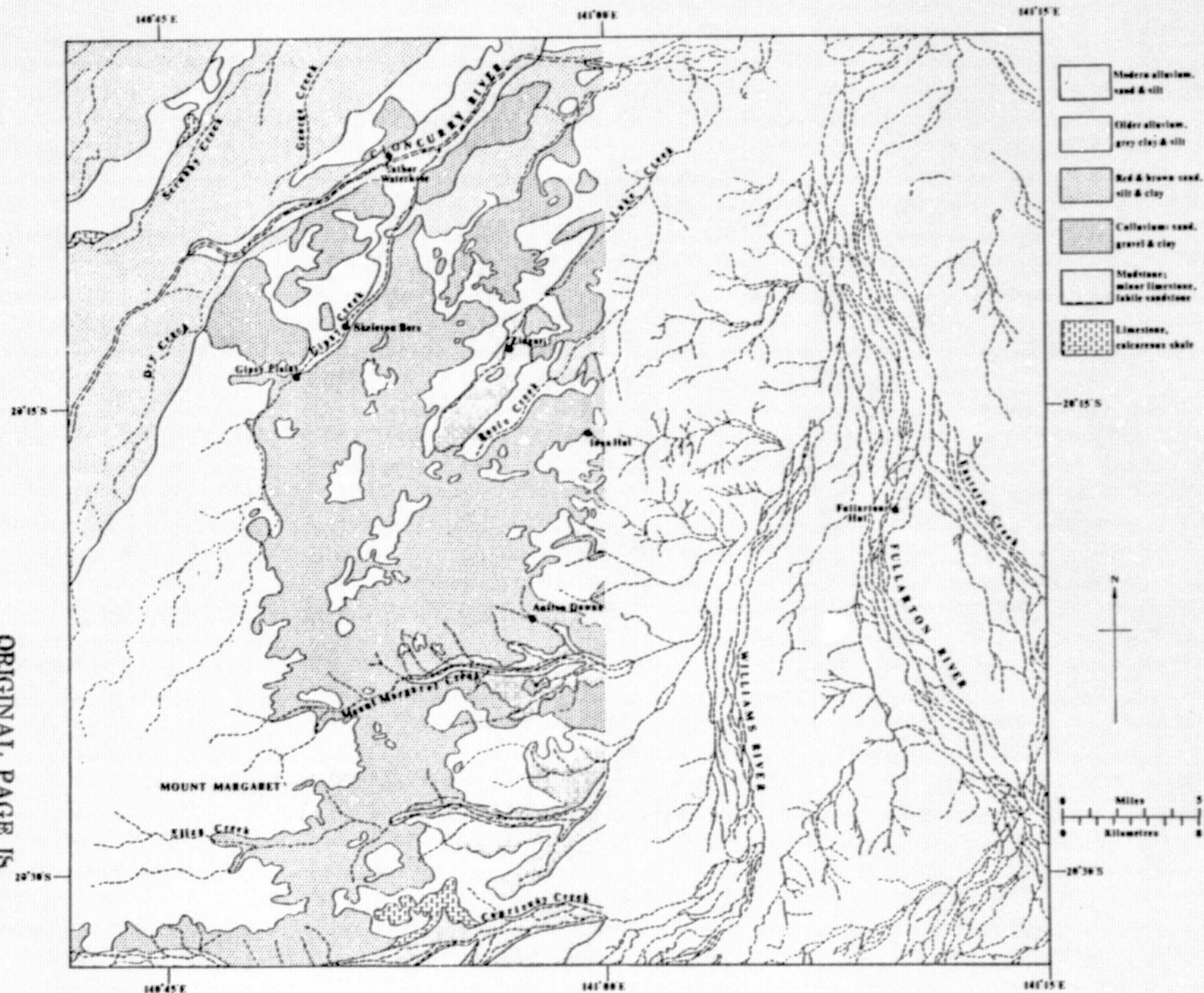
The Cloncurry Plains: Spectral signatures recognised on the colour composite generated from positives of MSS bands 4, 5 and 7 of grid section 22 of LANDSAT 2 imagery: ID 2183-23552: 24 July 1975.

THE CLONCURRY PLAINS - SUPERFICIAL DEPOSITS

AFTER CLONCURRY SHEET SF 54-2
AND JULIA CREEK SHEET SF 54-3

Figure 75 The Cloncurry Plains. Superficial Deposits (after the
Bureau of Mineral Resources)

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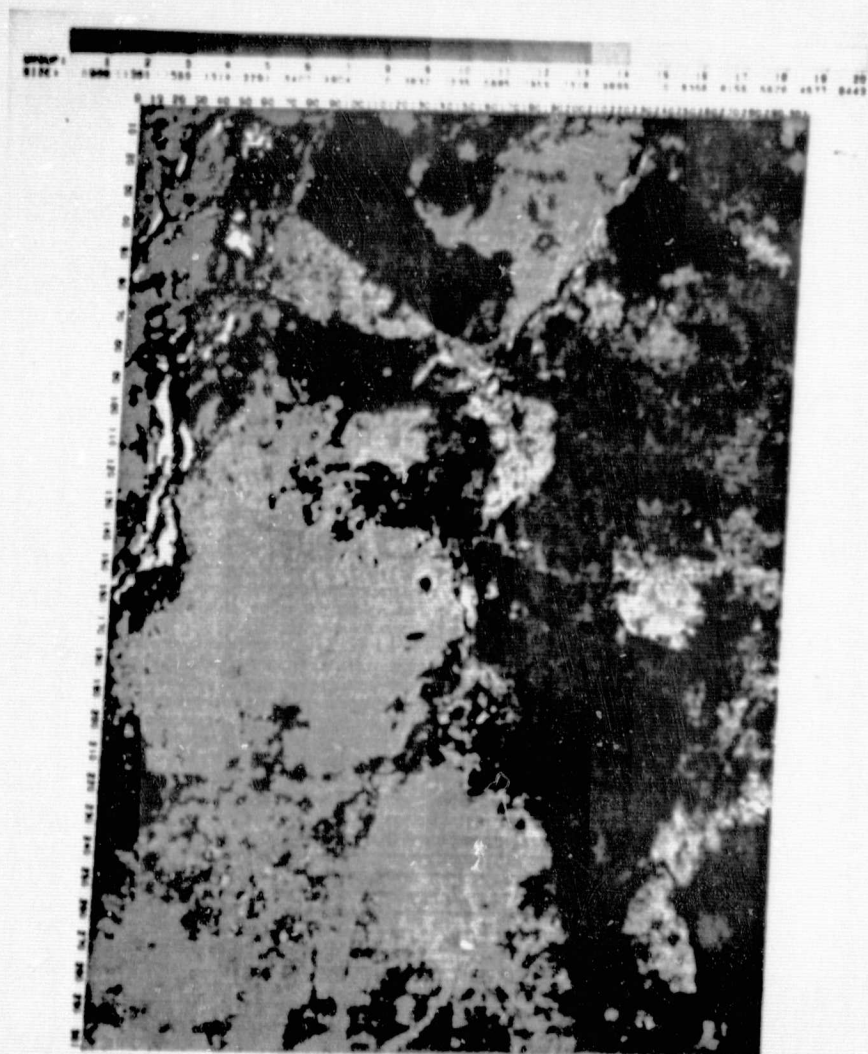


Figure 76 The Cloncurry Plains. Colour composite generated from MSS bands 4, 5 and 7 of the CCTs of LANDSAT 2: ID 2039-23555: 2 March 1975.

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CLONCURRY PLAINS
OLD - NEW ALLUVIUM

CCT Image Resolution 1x1 Pixel
Interpreted at a scale of 1:32,000
Job 7/017

Multispectral signatures

Combination of LANDSAT 2 bands
imaged on 2nd March 1975
I.D. No. 2039 23555

Band 4 + blue filter
Band 5 + green filter
Band 7 + red filter

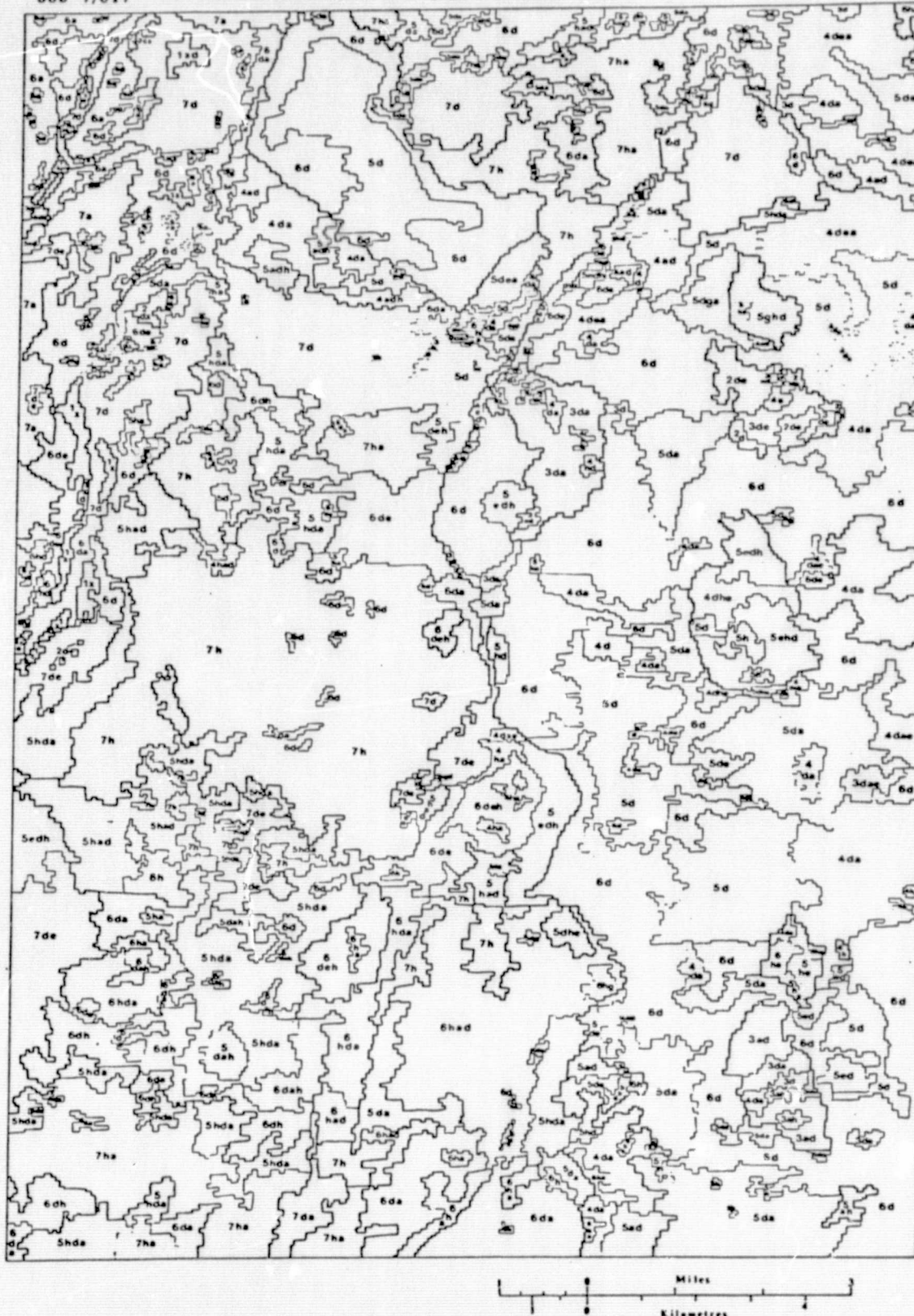


Figure 77

The Cloncurry Plains. Spectral signatures recognised on the colour composite generated from MSS bands 4, 5 and 7 of the CCTs of LANDSAT imagery covering the Gipsy Plains area. LANDSAT 2: ID 2039-23555: 2 March 1975.

CLONCURRY PLAINS
OLD - NEW ALLUVIUM
Job 7/017
CCT Image Resolution 1x1 Pixel
Scale 1:32,000

SUPERFICIAL DEPOSITS
Interpreted from a
Combination of LANDSAT 2 bands
imaged on 2nd March 1975
I.D. No. 2039 23555

Band 4 + blue filter
Band 5 + green filter
Band 7 + red filter

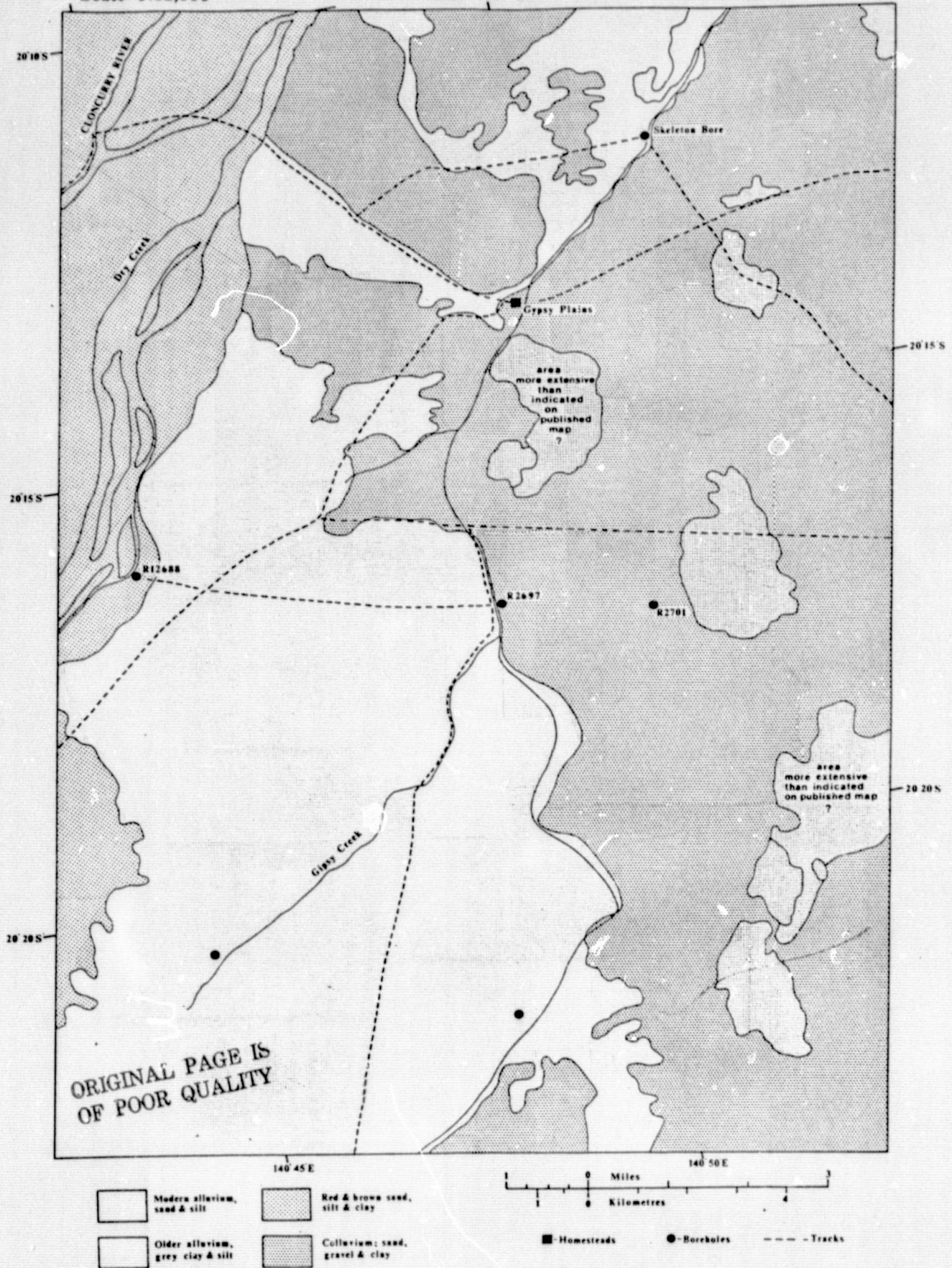
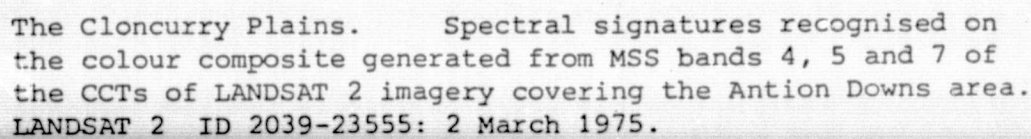


Figure 78

The Cloncurry Plains Area. Distributions of superficial seposits interpreted from the colour composite generated from MSS bands 4, 5 and 7 of the CCTs of LANDSAT 2 imagery covering the Gipsy Plains area. LANDSAT 2 : ID 2039-23555: 2 March 1975.

Band 4 + blue filter
Band 5 + green filter
Band 7 + red filter



The Cloncurry Plains: vegetation interpreted from air photos of survey flown in May 1975.

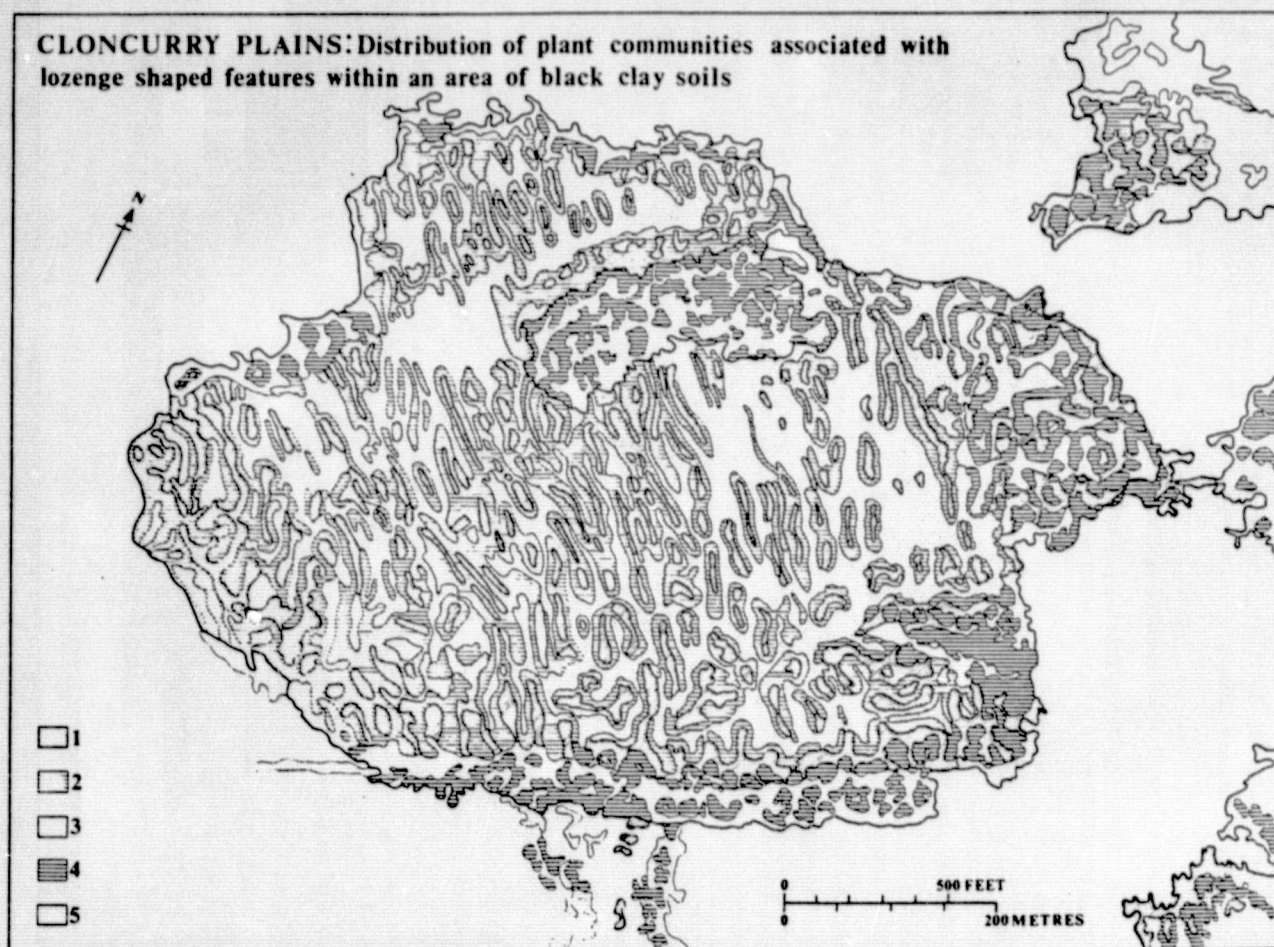


Figure 81

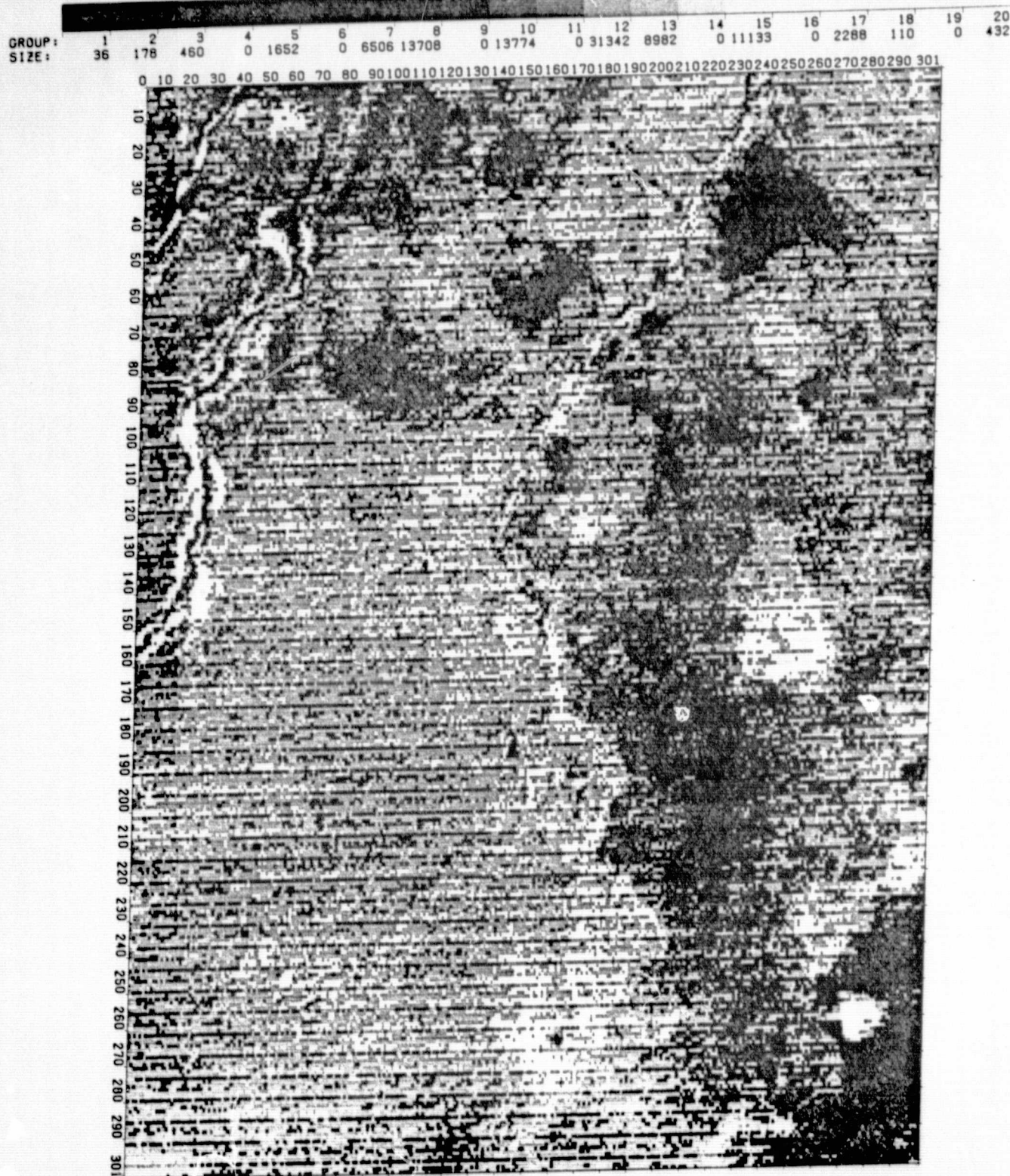
The Cloncurry Plains: Plant communities producing lozenge shape patterns interpreted from the air photos of survey flown in May 1975.

Key

1. Community of soft grasses with few scattered shrubs, producing blue spectral signatures in centre of lozenge shaped area.
2. Community of soft grasses producing dark green/blue spectral signatures around the periphery of each lozenge shaped area.
3. Community of soft grasses producing yellow spectral signatures in the areas between the lozenge shaped features
4. Community of soft grasses with *Triodia pungens* and scattered shrubs producing dark blue/green spectral signatures.
5. Bare ground producing white spectral signatures.

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BOUNDARY BETWEEN OLD AND NEW ALLUVIUM CLONCURRY PLAINS 1*1 PIXEL CCT1 JOB 7/01\$
 20 GROUPS - SLICE: LANDSAT BAND 4 RANGE 100.0 TO 190.0



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Figure 82

The Cloncurry Plains: The Gipsy Plains area. Output produced by density slicing the data in MSS band 4 into twenty groups. Output from CCT of LANDSAT 2: ID 2039-23555: 2 March 1975

70

BOUNDARY BETWEEN OLD AND NEW ALLUVIUM CLONCURRY PLAINS 1*1 PIXEL CCT1 JOB 7/019L
 20 GROUPS - SLICE: LANDSAT BAND 5 RANGE 43.00 TO 240.0



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Figure 83

The Cloncurry Plains: The Gipsy Plains area. Output produced by density slicing the data in MSS band 5 into twenty groups. Output from CCT of LANDSAT 2: ID 2039-23555: 2 March 1975.

BOUNDARY BETWEEN OLD AND NEW ALLUVIUM CLONCURRY PLAINS 1*1 PIXEL CCT1 JOB 7/019L
 20 GROUPS - SLICE: LANDSAT BAND 6 RANGE 170.0 TO 450.0



Figure 84

The Cloncurry Plains: The Gipsy Plains area. Output produced by density slicing the data in MSS band 6 into twenty groups. Output from CCT of LANDSAT 2: ID 2039-23555: 2 March 1975.

BOUNDARY BETWEEN OLD AND NEW ALLUVIUM CLONCURRY PLAINS 1*1 PIXEL CCT1 JOB 7/01\$
20 GROUPS - SLICE: LANDSAT BAND 7 RANGE 70.00 TO 200.0



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Figure 85

The Cloncurry Plains: The Gipsy Plains area. Output produced by density slicing the data in MSS band 7 into twenty groups. Output from CCT of LANDSAT 2: ID 2039-23555: 2 March 1975.

THE CLONCURRY PLAINS: Grid Section 22 LANDSAT 1 22nd December 1972
Spectral Signatures of Areas Recently Affected by Fire I.D. No. 1152 00073

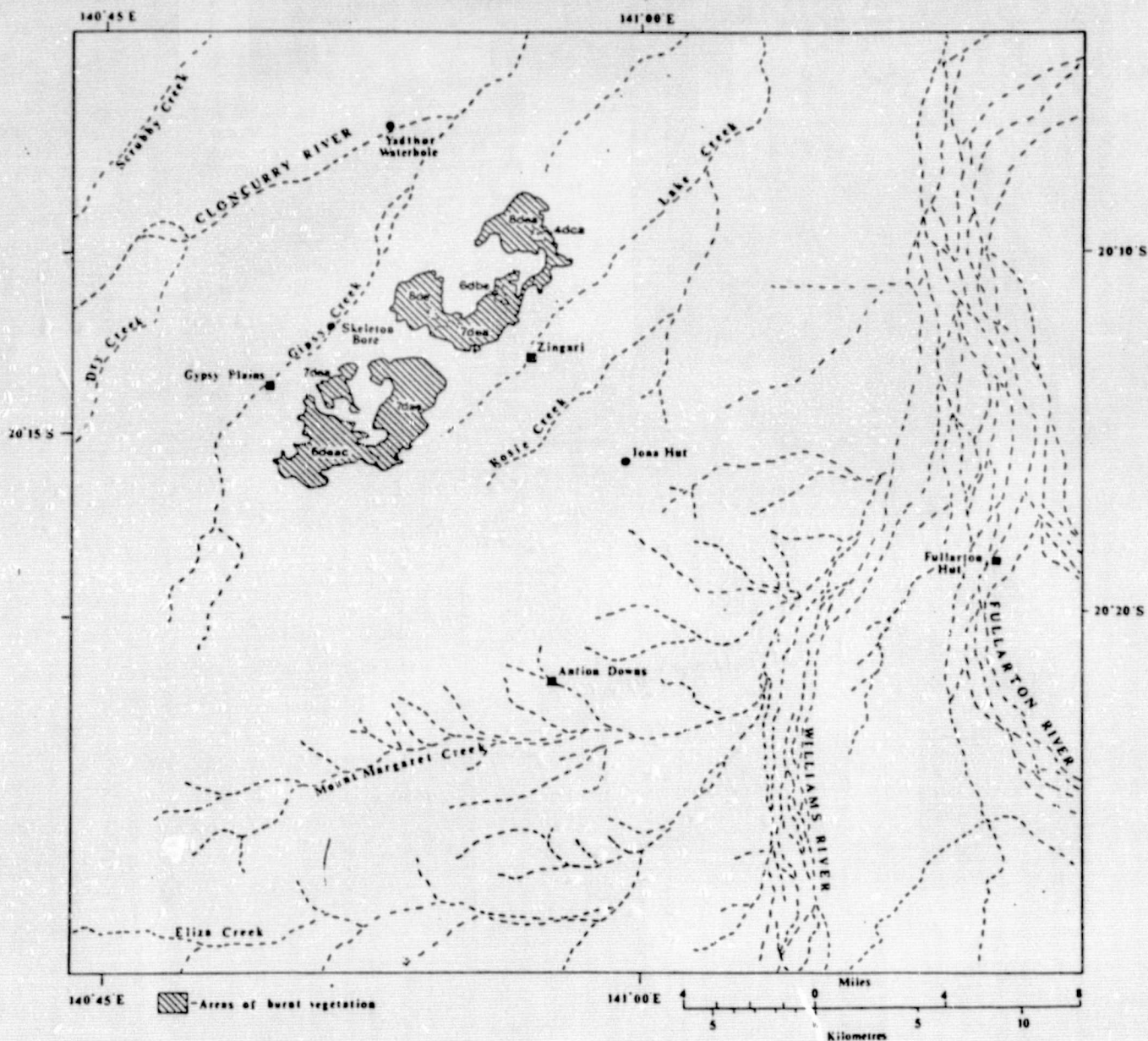


Figure 86

The Cloncurry Plains: Spectral signatures of recently burnt areas recognised on the colour composite generated from positives of MSS bands 4, 5 and 7 of LANDSAT 1 imagery: ID 1152-00073: 22 December 1972.

THE CLONCURRY PLAINS: Grid Section 22 LANDSAT 1 16th November 1972
Spectral Signatures of Areas Prior to Burning I.D. No. 1116 00073

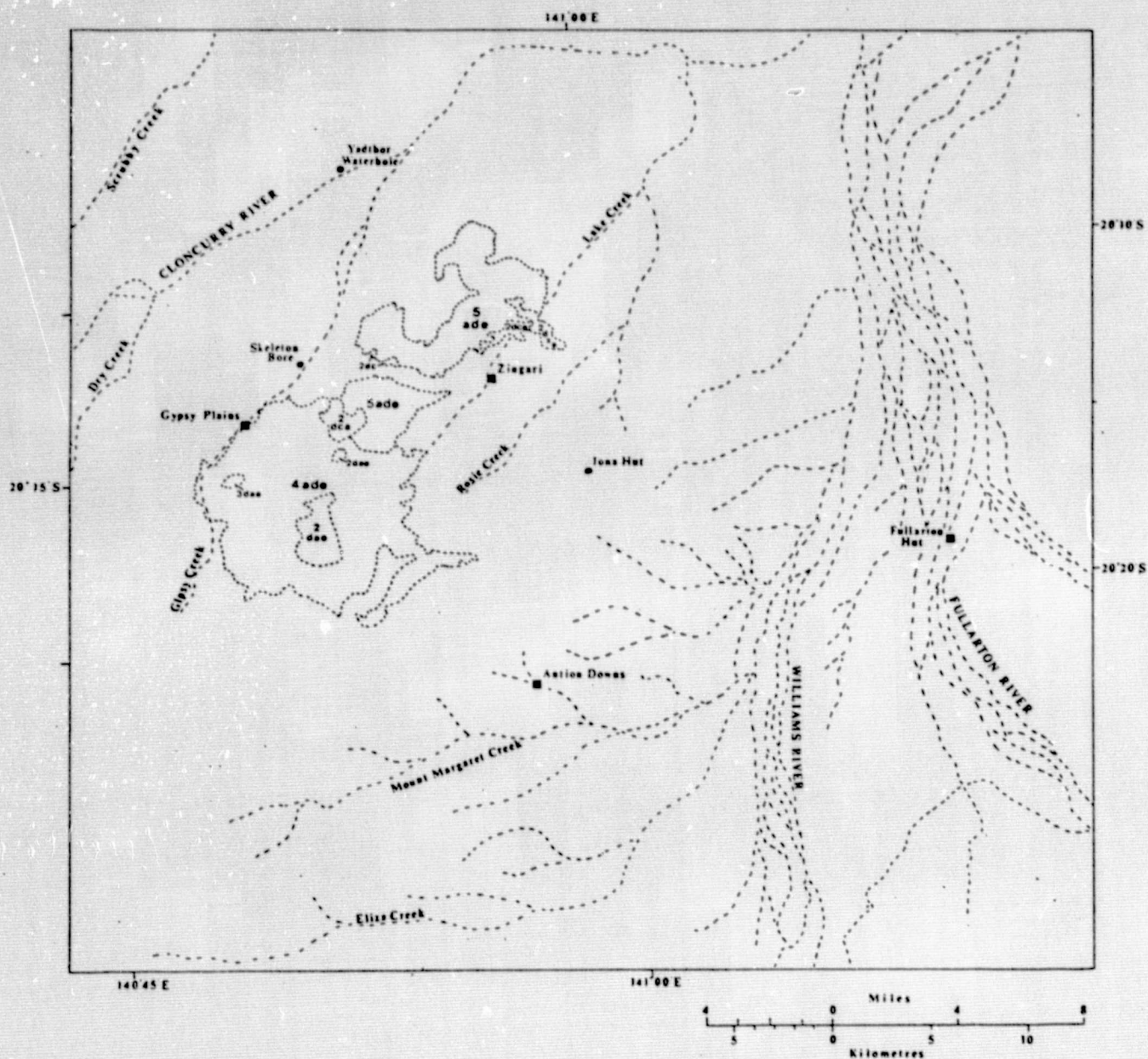


Figure 87

The Cloncurry Plains: Spectral signatures of areas prior to burning recognised on the colour composite generated from positives of MSS bands 4, 5 and 7 of LANDSAT 1 imagery: ID 1116-00073: 16 November 1972.

THE CLONCURRY PLAINS: Grid Section 22 LANDSAT 2 2nd March 1975
Spectral Signature Changes Caused by Vegetation Recovery After Fire I.D. No. 2039 23555

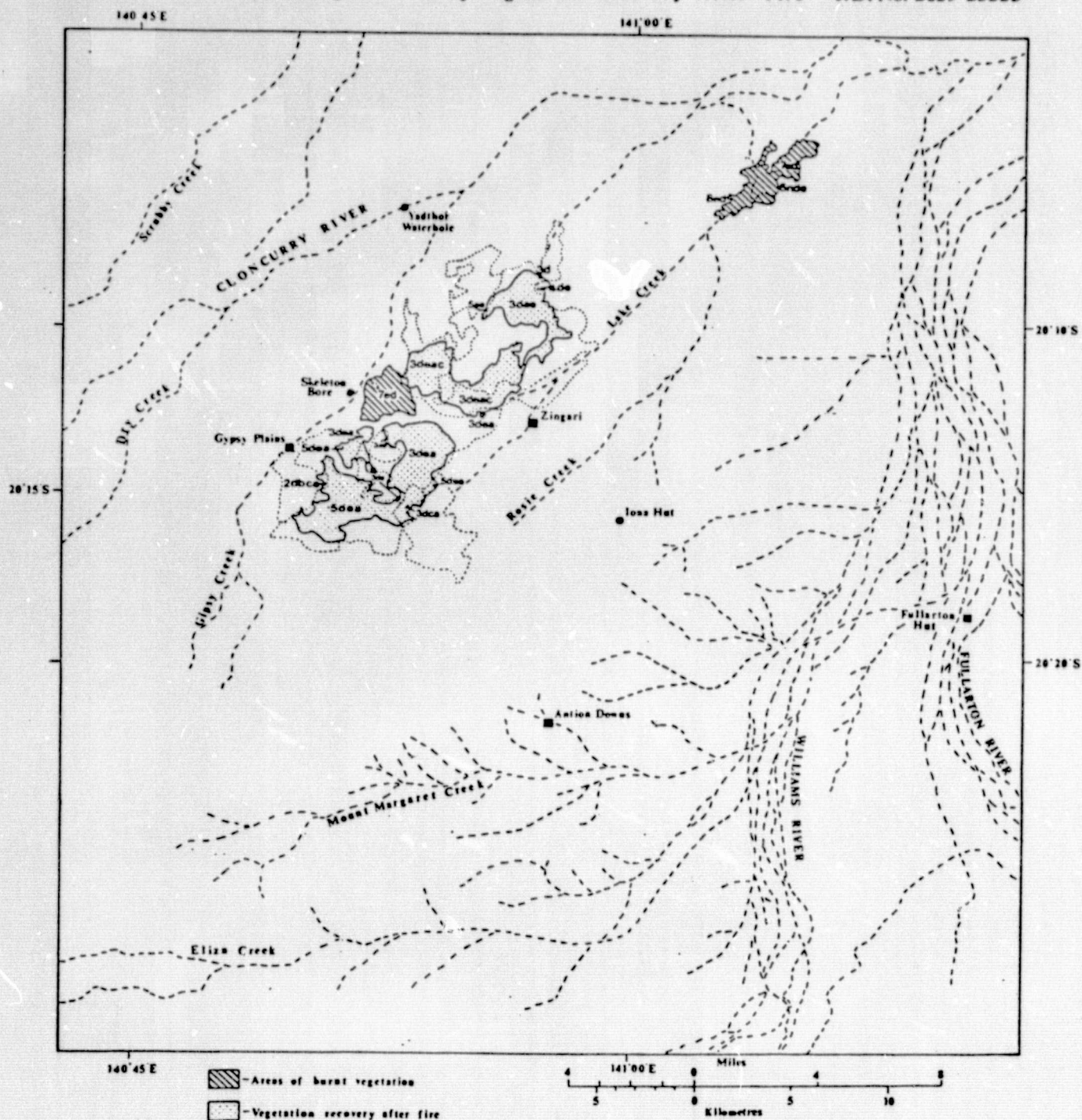


Figure 88 The Cloncurry Plains: Spectral signatures of areas recovering from burning recognised on the colour composite generated from positives of MSS bands 4, 5 and 7 of LANDSAT 2 imagery: ID 2039-23555 2 March 1975.

THE CLONCURRY PLAINS: Grid Section 22 LANDSAT 2 24th July 1975
Spectral Signature Changes Caused by Vegetation Recovery After Fire I.D. No. 2183 23552

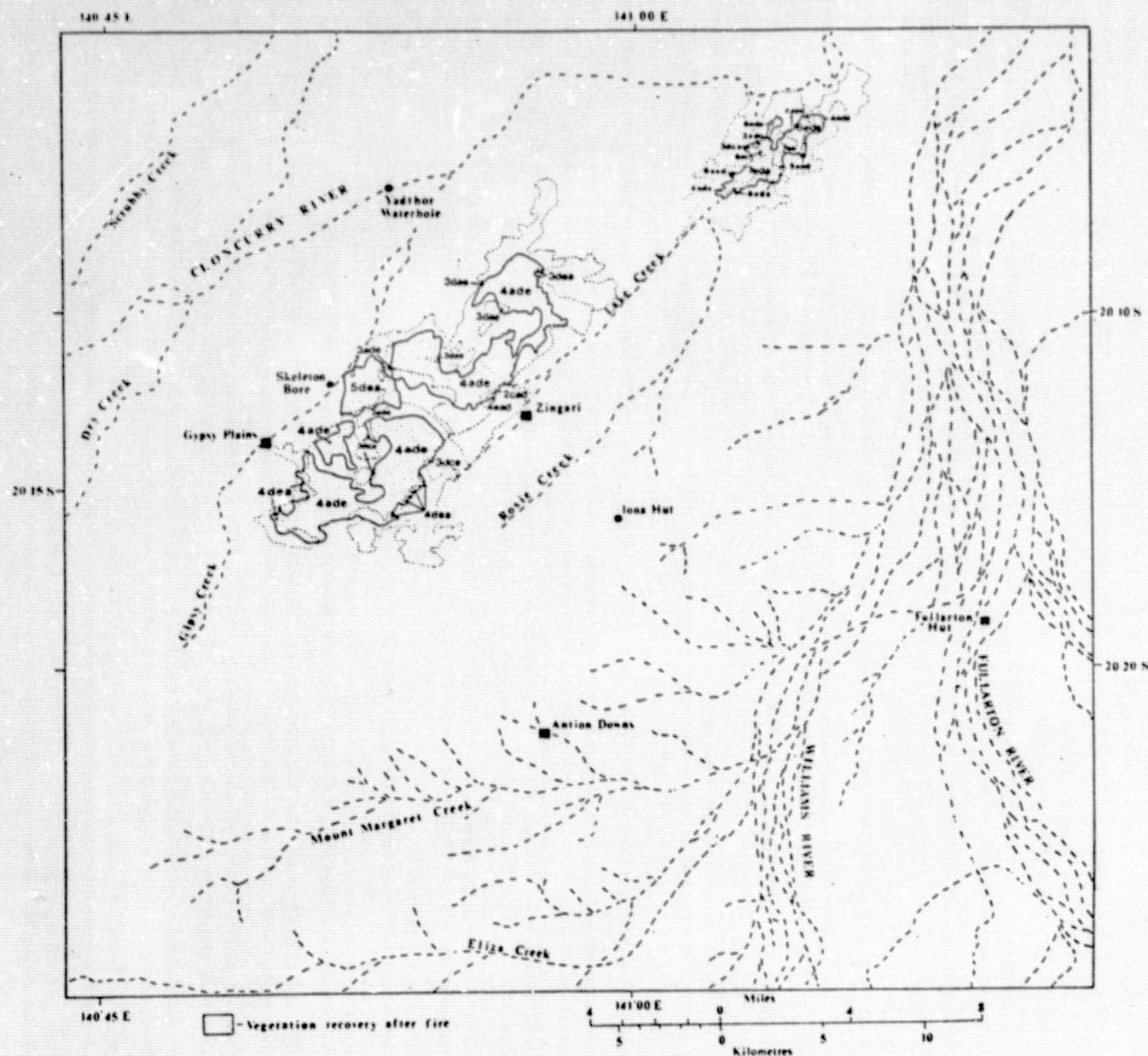


Figure 89 The Cloncurry Plains: Spectral signatures of areas recovering from burning recognised on the colour composite generated from positives of MSS bands 4, 5 and 7 on LANDSAT 2 imagery: ID 2183-23552: 24 July 1975.

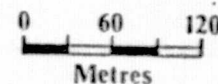


- | | |
|----|---------------------|
| 1 | 12 |
| 2 | 13 |
| 3 | 14 |
| 4 | 15 |
| 5 | 16 |
| 6 | 17 |
| 7 | 18 |
| 8 | 19 |
| 9 | 20 |
| 10 | 21 |
| 11 | combined signatures |

DUGALD RIVER AREA

Film 33 Frame 115

Infra red colour film: individual spectral signatures



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Figure 90

The Dugald River Lode Area: Spectral signatures recognised on the infra-red colour photography film 33/115 flown in April 1971.

DUGALD RIVER AREA

Interpretation of the spectral signatures displayed by
the infrared colour imagery with a red filter in
combination with the panchromatic and yellow filter
imagery with a yellow filter film 33 frame 115
flown at a scale of 1:15 000

Spectral Signature	Composition of Vegetation Association/Plant Community	Soils/Geomorphology/Geology
1. Red 44C and greyed orange 164B	<i>Polycarpaea glabra</i> and <i>Eriachne mucronata</i> dominant with <i>Bulbostylis barbata</i> and <i>Fimbristylis</i> sp as subsidiary species	Reddish brown stony clays over the Dugald River Lode
2. Violet 87D	<i>Sporobolus australasicus</i> dominant in ground layer	Red sandy clay loam over mixed colluvial and residual material of interfluves
3. Red purple 63C	<i>Eriachne dominii</i> dominant in ground layer	ditto
4. Red purple 65C	<i>Enneapogon polyphyllus</i> dominant in ground layer	ditto
5. Red purple 69D with blue green 123D	<i>Enneapogon polyphyllus</i> dominant but sparse ground cover	ditto with much quartz gravel veneering the surface
6. Greyed purple 186D	<i>Enneapogon polyphyllus</i> and <i>Sporobolus australasicus</i> co-dominant in ground layer	Red sandy clay loam over mixed colluvial and residual material
7. Blue green 123D and white	<i>Aristida contorta</i> dominant in ground layer	Red sandy clay loam over mixed colluvial and residual material on interfluves
8. Blue green 116D with red purple 65D	<i>Triodia pungens</i> dominant with scattered <i>Eucalyptus</i> spp trees	Skeletal red sandy soils over near surface bedrock outcrop of limestone agglomerate shale and calc silicate rocks
9. Blue green 123D	<i>Triodia pungens</i> dominant in ground layer	Red sandy soils over mixed colluvial and residual material on interfluves
10. Blue green 121D	<i>Triodia pungens</i> dominant but sparse with much bare ground	ditto
11. Blue green 123C with red purple 65C	<i>Triodia pungens</i> and <i>Enneapogon polyphyllus</i> co-dominant on ground layer	ditto
12. Blue green 119D	<i>Triodia pungens</i> dominant but sparse with much bare ground and scattered <i>Eucalyptus</i> spp trees.	ditto

C-2

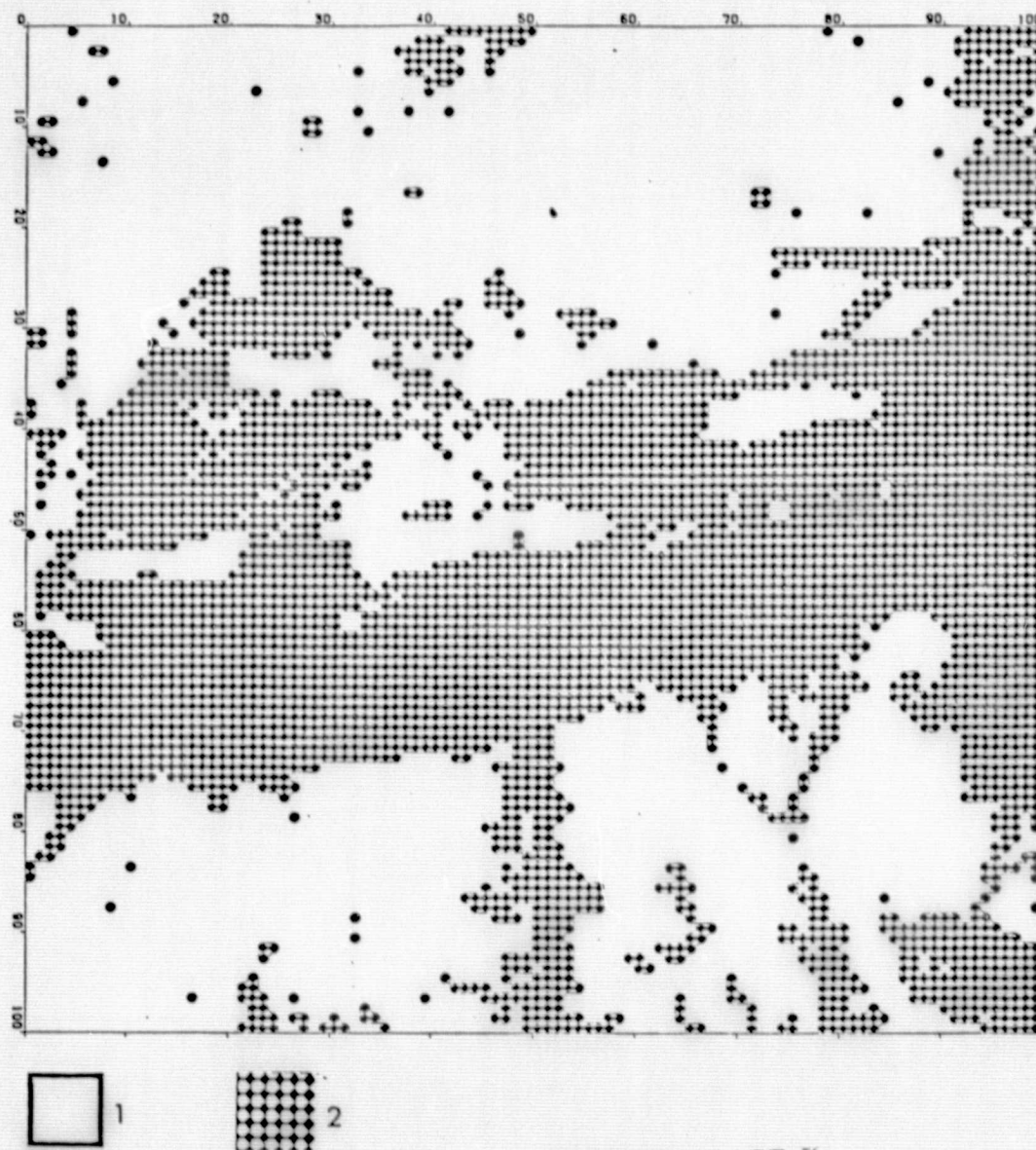
Spectral Signature	Composition of Vegetation Association/Plant Community	Soils/Relief/Geology
13. Blue green 120D and 123D with red purple 65D	<i>Triodia pungens</i> dominant but sparse with much bare ground and scattered <i>Eucalyptus</i> spp trees	Red sandy soils over mixed colluvial and residual material on interfluvies
14. Blue green 116D with red purple 65D	<i>Triodia pungens</i> with <i>Acacia chisholmii</i> shrubs	Dissected terrain flanking creeks
15. Very dark blue	<i>Triodia pungens</i> and shrubs	ditto
16. White		Largely bare ground
17. Blue green 121C		ditto
18. Blue green 123C		Quartz rubble veneer
19. Blue green 123D with white		Largely bare area over calc silicate rocks
20. Red purple with blue green 123D and white	<i>Eucalyptus camuldularis</i> <i>Tristania grandiflora</i> dominant with other tree and shrub species and bare ground between trees	River bed
21. Red purple	<i>Eucalyptus terminalia</i> <i>Tephrosia sp nov</i> and <i>Acacia chisholmii</i>	River bed

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AUSTRALIAO FILM 33.FRAME 115. FALSE COLOUR
CLASSIFIED BY POLYDIV : 20/10/77

RATIOED

OF SHADING	POINTS
1 -	5678
2 ABCDEFD	4322



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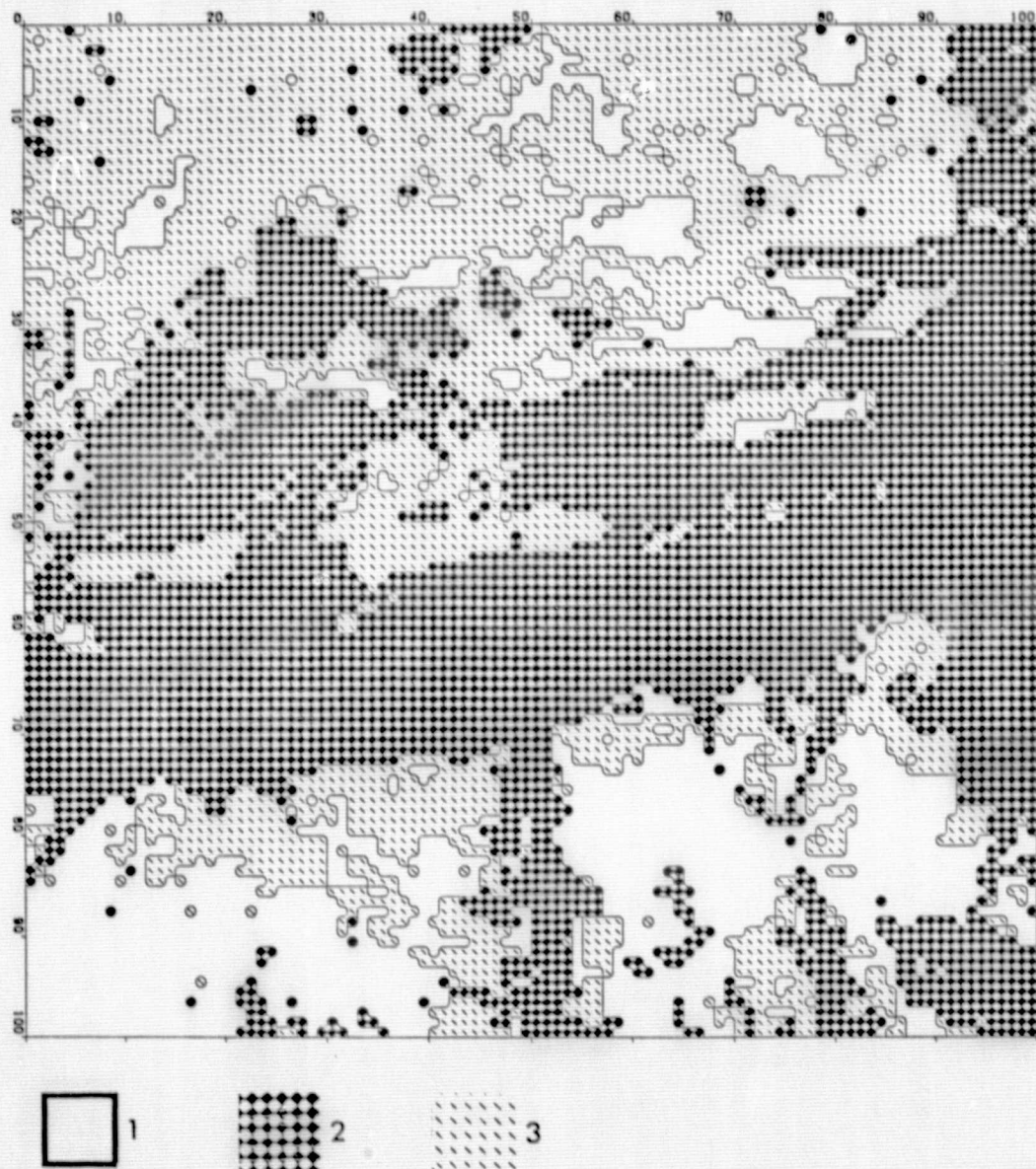
Figure 91

The Dugald River Lode Area. Computer generated map showing unsupervised classification into two groups of the spectral signatures recognised on the infra-red colour photography of film 33/115 flown in April 1971.

AUSTRALIAO FILM 33.FRAME 115. FALSE COLOUR
CLASSIFIED BY POLYDIV : 20/10/77

RATIOED

OP SHADING	POINTS
1 -	2222
2 ABCDEFG	4322
3 E	3456



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Figure 92

The Dugald River Lode Area. Computer generated map showing unsupervised classification into three groups of the spectral signatures recognised on the infra-red colour photography of film 33/115 flown in April 1971.

AUSTRALIAO FILM 33.FRAME 115. FALSE COLOUR
CLASSIFIED BY POLYDIV : 20/10/77

RATIOED

OP SHADING	POINTS
1	2222
2	ABCEFD
3	E
4	ABD

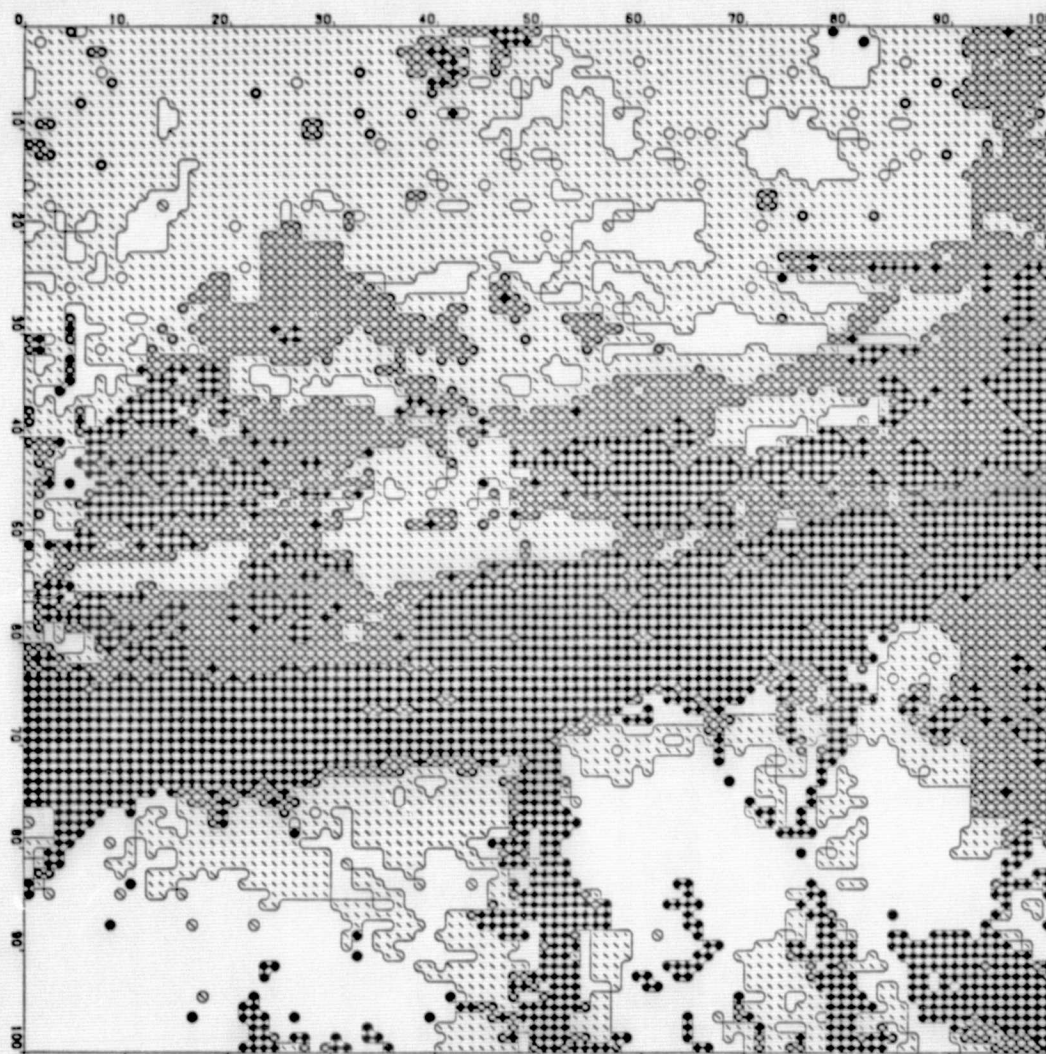


Figure 93 The Dugald River Lode Area. Computer generated map showing unsupervised classification into four groups of the spectral signatures recognised on the infra-red colour photography of film 33/115 flown in April 1971.

AUSTRALIAN FILM 33.FRAME 115. FALSE COLOUR
CLASSIFIED BY POLYDIV : 20/10/77

RATIOED

OF SHADING	POINTS	OF SHADING	POINTS
1	828	S H	1395
2 ABCDEFD	2368		
3 E	3456		
4 ABO	1956		

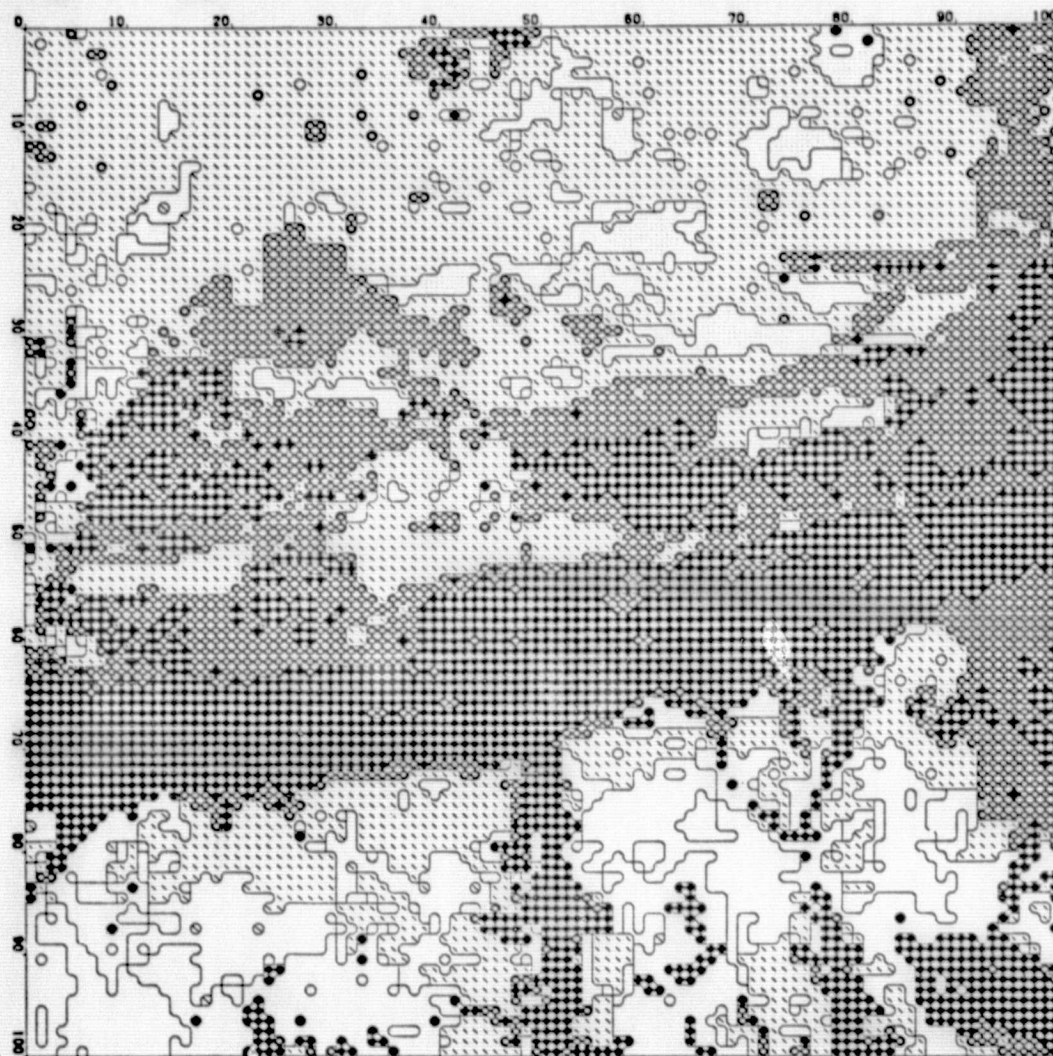


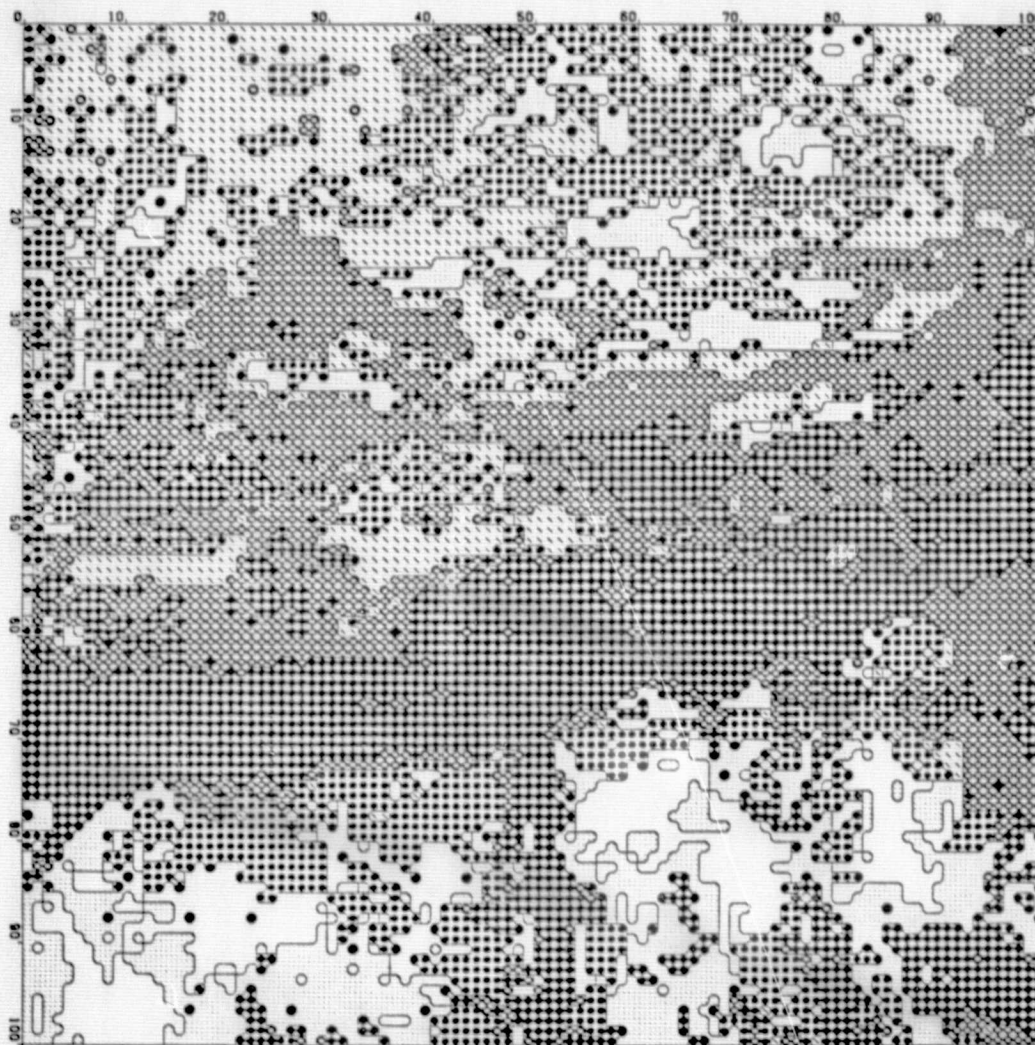
Figure 94

The Dugald River Lode Area. Computer generated map showing unsupervised classification into five groups of the spectral signatures recognised on the infra-red colour photography of film 33/115 flown in April 1971.

AUSTRALIAO FILM 33.FRAME 115. FALSE COLOUR
CLASSIFIED BY POLYDIV : 20/10/77

RATIOED

OF SHADING	POINTS	OF SHADING	POINTS
1 -	826	5 H	1396
2 ABCDEFD	2366	6 OIJ	1962
3 E	1494		
4 ABG	1956		



1



2



3



4



5



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Figure 95

The Dugald River Lode Area. Computer generated map showing unsupervised classification into six groups of the spectral signatures recognised on the infra-red colour photography of film 33/115 flown in April 1971.

AUSTRALIAO FILM 33.FRAME 115. FALSE COLOUR
CLASSIFIED BY POLYDIV : 20/10/77

RATIOED

OP SHADING	POINTS	OP SHADING	POINTS
1 -	3	5 H	1396
2 ABCDEFG	2366	6 OIJ	1962
3 E	1494	7 Q	823
4 RSO	1956		

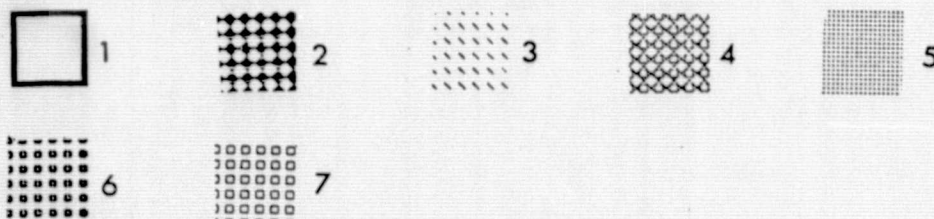


Figure 96 The Dugald River Lode Area. Computer generated map showing unsupervised classification into seven groups of the spectral signatures recognised on the infra-red colour photography of film 33/115 flown in April 1971.

AUSTRALIAO FILM 33.FRAME 115. FALSE COLOUR
CLASSIFIED BY POLYDIV : 09/12/77

RATIOED

OF SHADING	POINTS	OF SHADING	POINTS
1 -	3	5 H	1396
2 ABCDEFGIJ	839	6 GIJ	1962
3 E	1494	7 G	823
4 ABG	1956	8 AF	1527



Figure 97

The Dugald River Lode Area. Computer generated map showing unsupervised classification into eight groups of the spectral signatures recognised on the infra-red colour photography of film 33/115 flown in April 1971.

AUSTRALIAO FILM 33,FRAME 115, FALSE COLOUR

RATIOED

10 GROUPS : FIELD MAP FOR TSI AUSTRALIA FILM 33 FRAME 115 FA : DATE 20/10/77

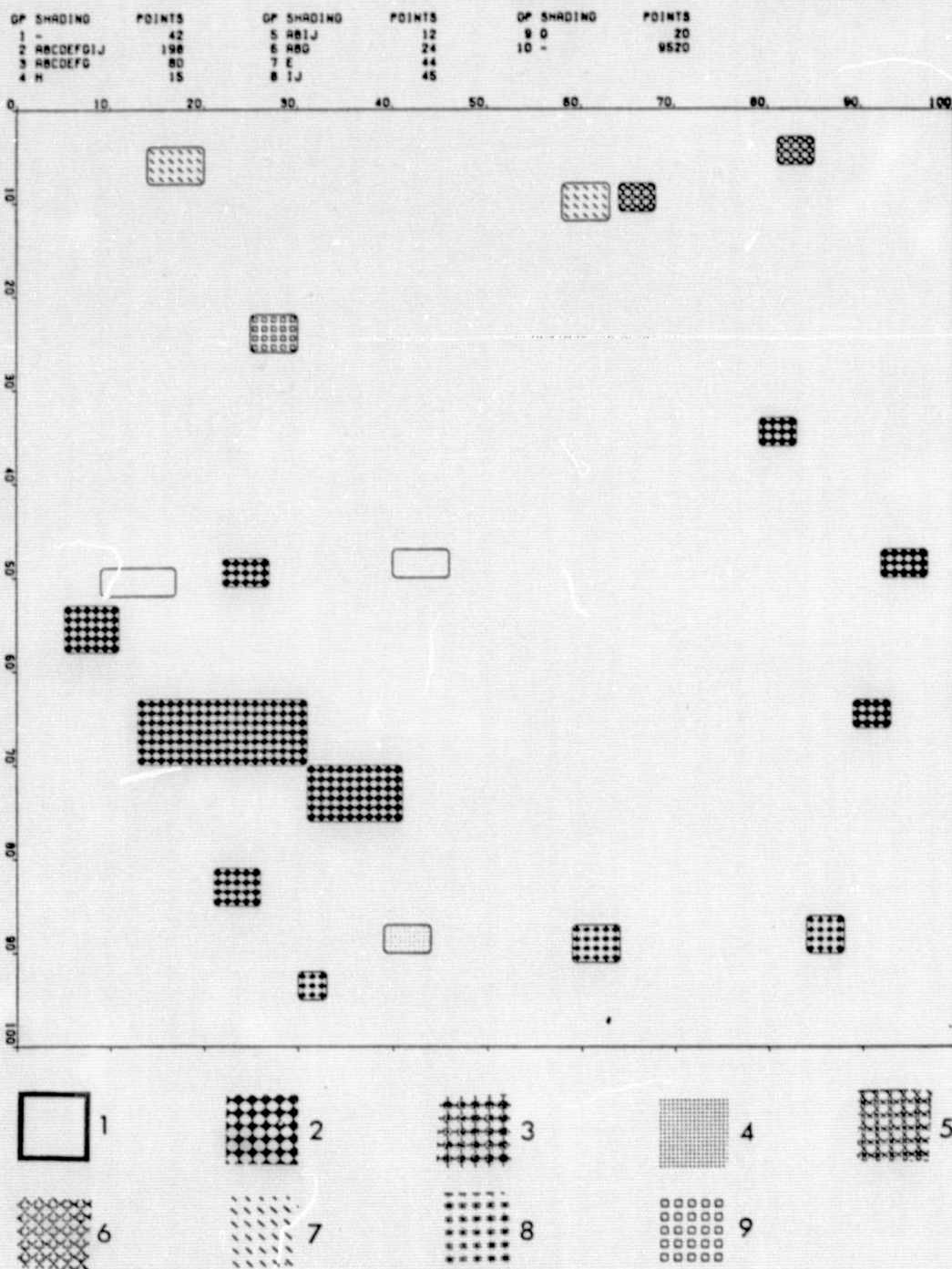


Figure 98

The Dugald River Lode Area. Training areas used for computer generated map showing supervised classification into nine groups of the spectral signatures recognised on the infra-red colour photography of film 33/115 flown in April 1971.

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AUSTRALIAO FILM 33.FRAME 115. FALSE COLOUR

RATIOED

9 GROUPS-SOUPED NO BIN 20/10/77 FROM TSI -AUSTRALIA FILM 33 FRAME 115 FA

OF SHADING	POINTS	OF SHADING	POINTS	OF SHADING	POINTS
1 -	1514	5 AB1J	471	9 0	578
2 ABCDEFGIJ	2210	6 ABO	1225		
3 ABCDEFG	1158	7 E	1200		
4 H	480	8 IJ	1186		

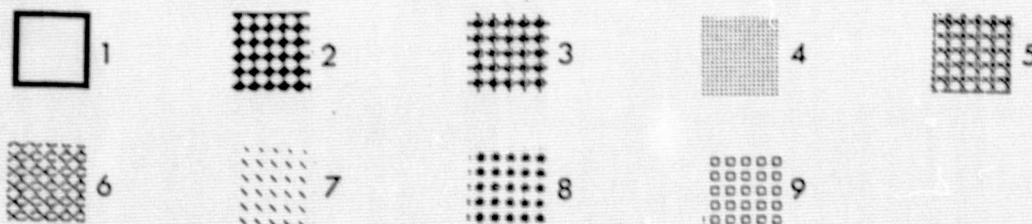
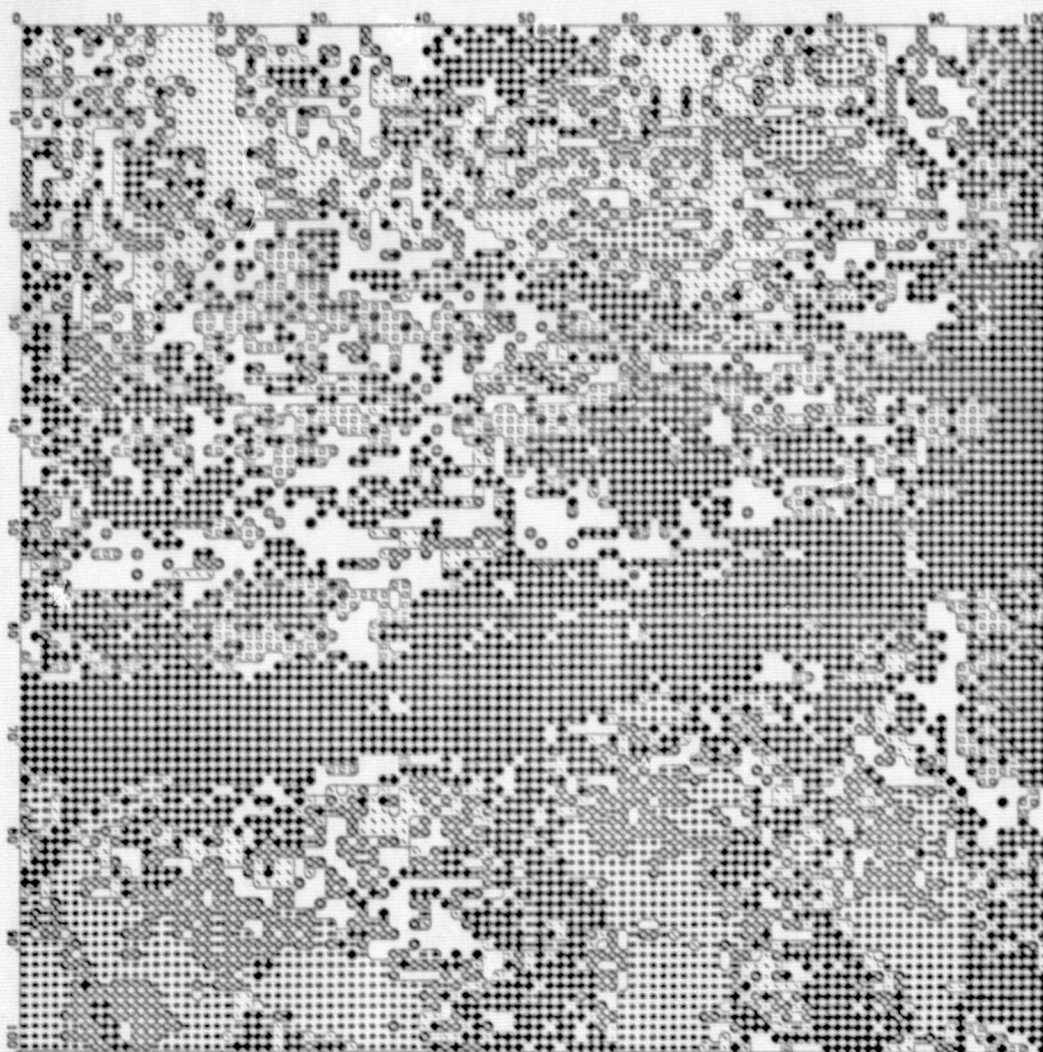


Figure 99 The Dugald River Lode Area. Computer generated map showing supervised classification into nine groups of the spectral signatures recognised on the infra-red colour photography of film 33/115 flown in April 1971.



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Figure 100 The Dugald River Lode Area. Print of panchromatic film
33/115 flown in April 1971.

ERTS FRAME 30A :

8 GROUPS : FIELD MAP FOR TSI DUGALD RIVER AREA ERTS 30A/R : DATE 01/12/77

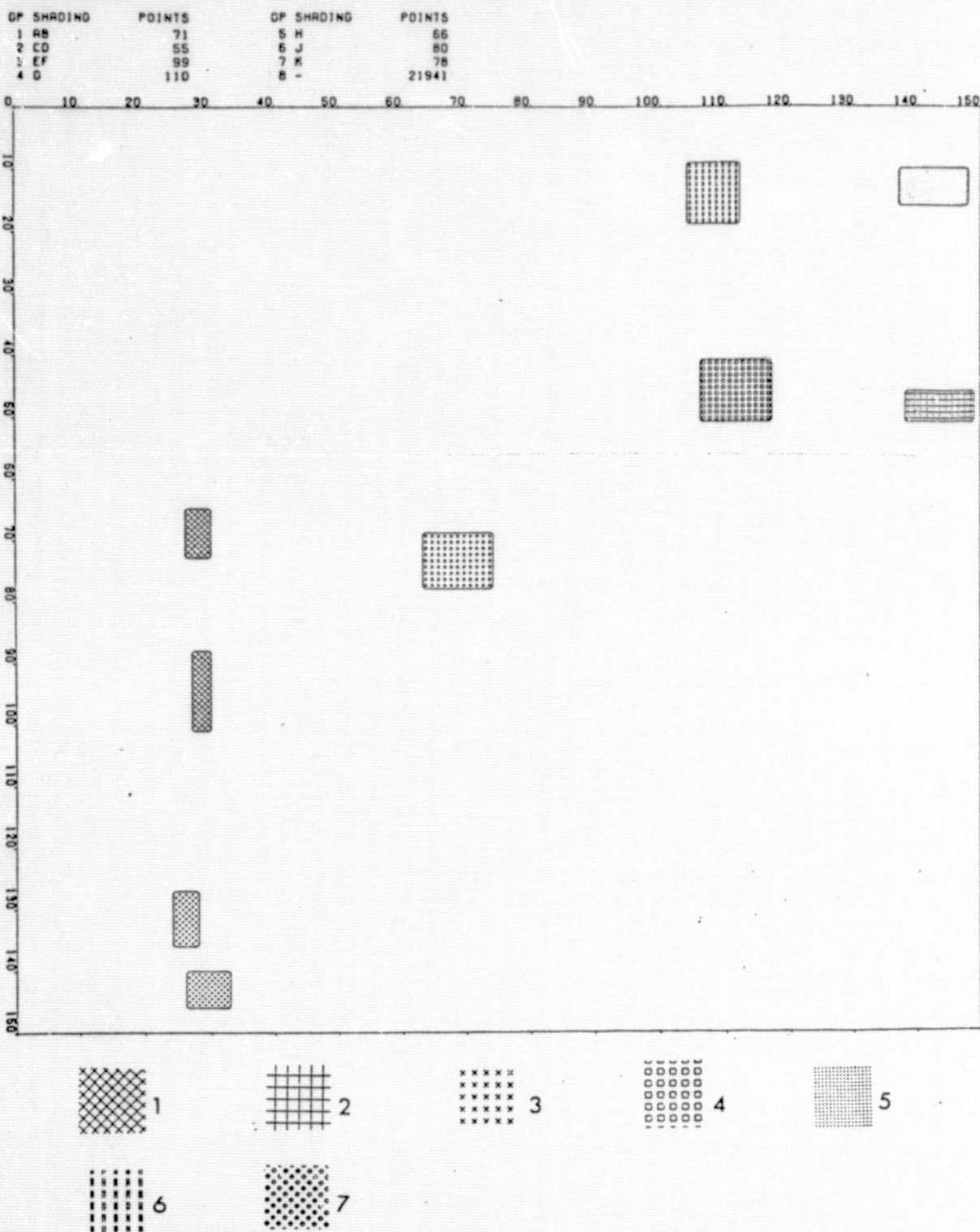


Figure 101

The Dugald River Lode Area. Training areas for the computer generated map showing supervised classification into seven groups of the spectral signatures recognised on the colour composite generated from positives of MSS bands 4, 5 and 7 of grid section 21 of LANDSAT 2 imagery: ID 2039-23555: 2 March 1975.

ERTS FRAME 30A

8 GROUPS-SOUPED CUTOFF 19.000 FROM TSI -DUGALD RIVER AREA ERTS 30A/R

GP SHADING	POINTS	GP SHADING	POINTS
1 AB	2198	5 H	1277
2 CD	1557	6 J	5675
3 EF	2395	7 K	4213
4 G	4422	8 -	763

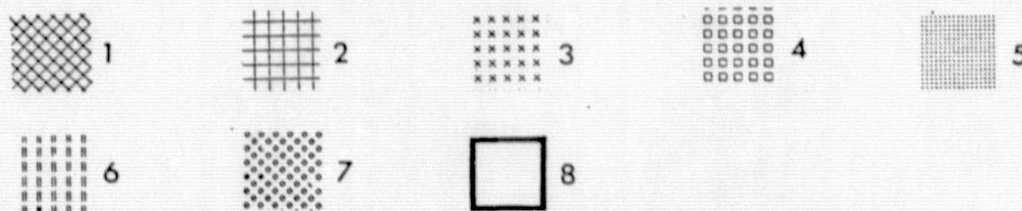
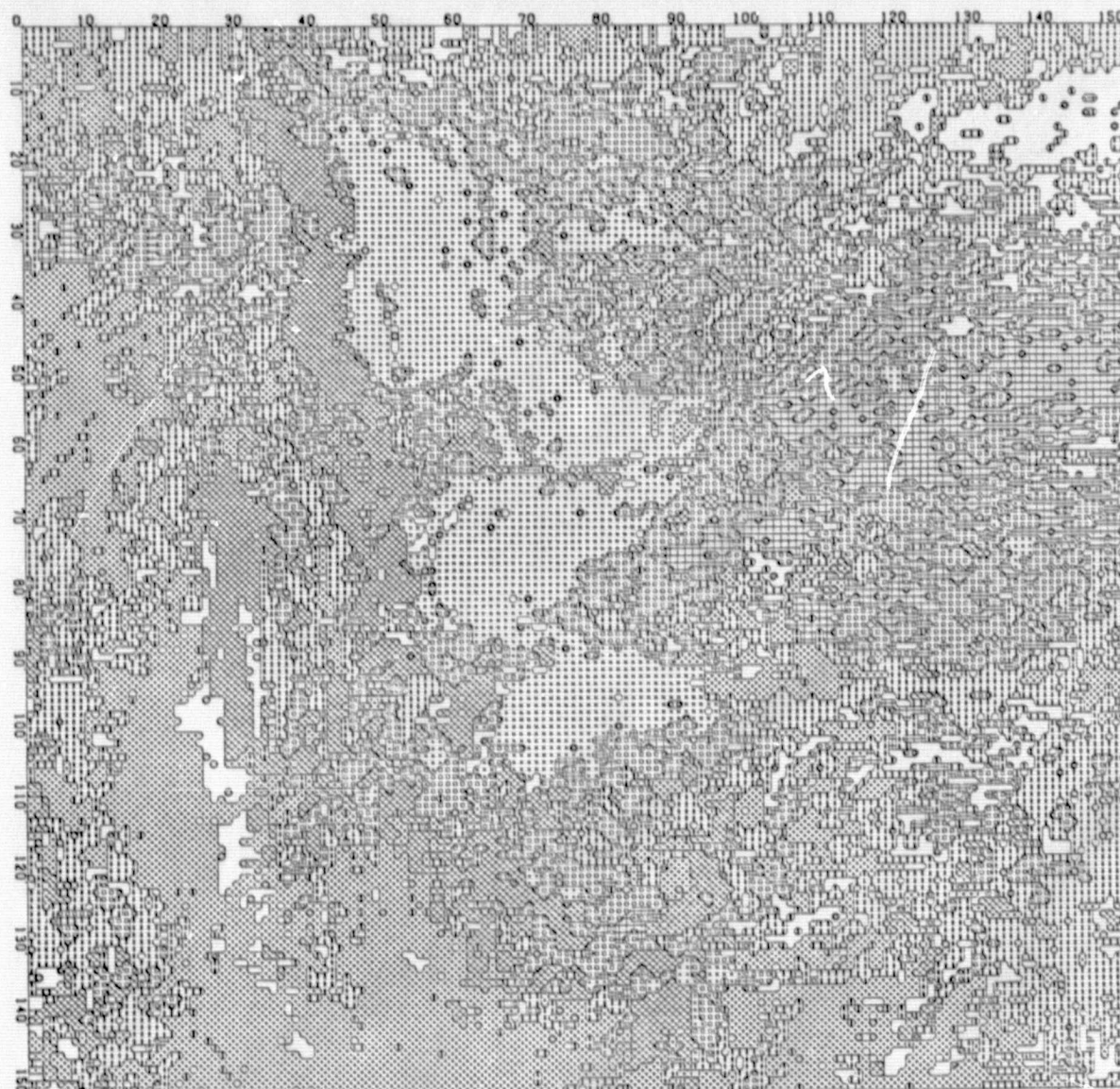


Figure 102

The Dugald River Area. Computer generated map showing supervised classification of the colour composite generated from MSS bands 4, 5 and 7 of grid section 21 of LANDSAT 2 imagery. ID:2039-23555: 2 March 1975.

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: DATE 01/12/77

GP	SHADING	POINTS	GP	SHADING	POINTS
1	AB	71	5	H	68
2	CD	55	6	J	80
3	EF	99	7	K	78
4	G	110	8	-	21941

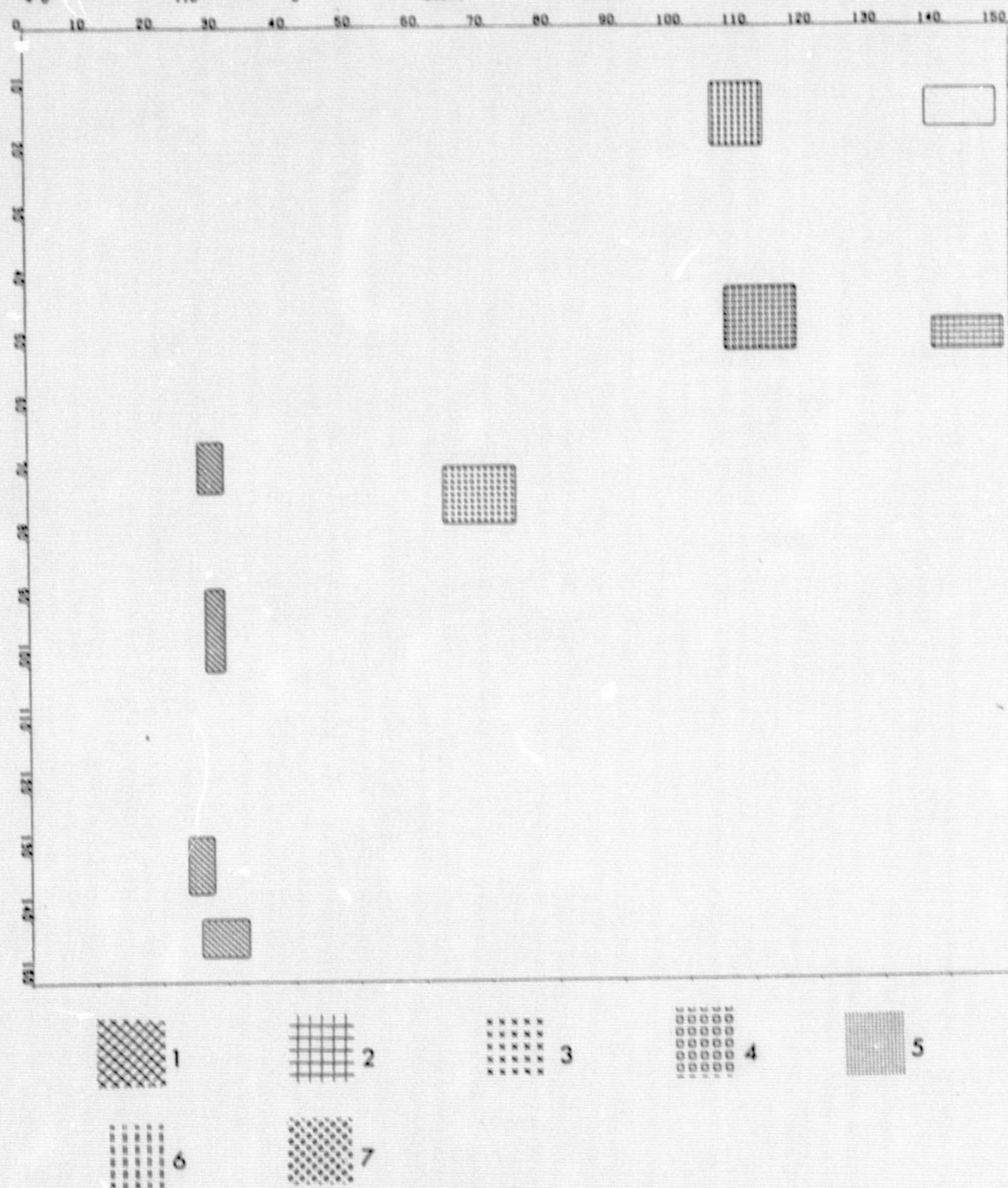


Figure 103

The Dugald River Area. Training areas designated on the colour composite of LANDSAT 2 for 2 March 1975 and used for the computer generated map showing supervised classification of the spectral signatures on the colour composite generated from MSS bands 4, 5 and 7 of grid section 21 of LANDSAT 2 imagery : ID 2183-23552: 24 July 1975.

ERTS FRAME 12A

8 GROUPS-SOUPED CUTOFF 19.000 FROM TSI -ERTS FRAME 12A DUGALD RIVER AR

OP SHADING	POINTS	OP SHADING	POINTS
1 AB	5017	5 H	2940
2 CD	1318	6 J	1244
3 EF	3371	7 K	3282
4 G	625	8 -	4663

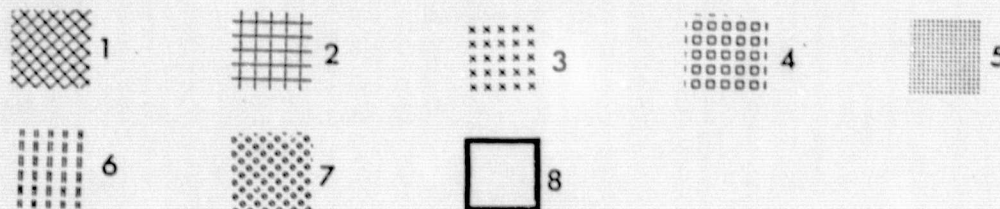
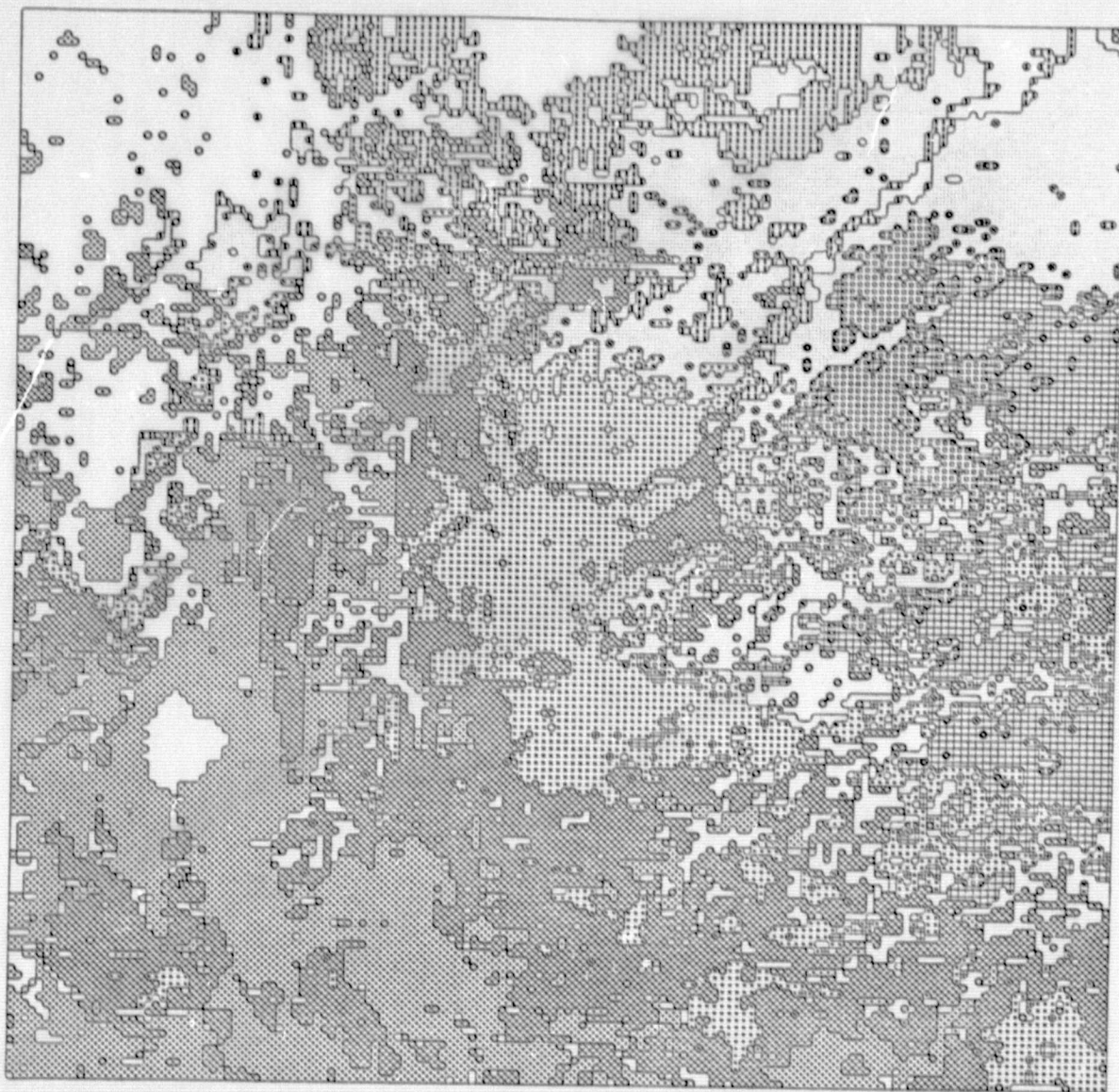


Figure 104

The Dugald River Area. Computer generated map showing supervised classification of the colour composite generated from MSS bands 4, 5 and 7 of grid section 21 of LANDSAT 2 imagery: ID 2183-23552: 24 July 1975.

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N. QUEENSLAND - ERTS BANDS 4,5,7
CLASSIFIED BY POLYDIV : 30/10/74
SHADINGS 127 160



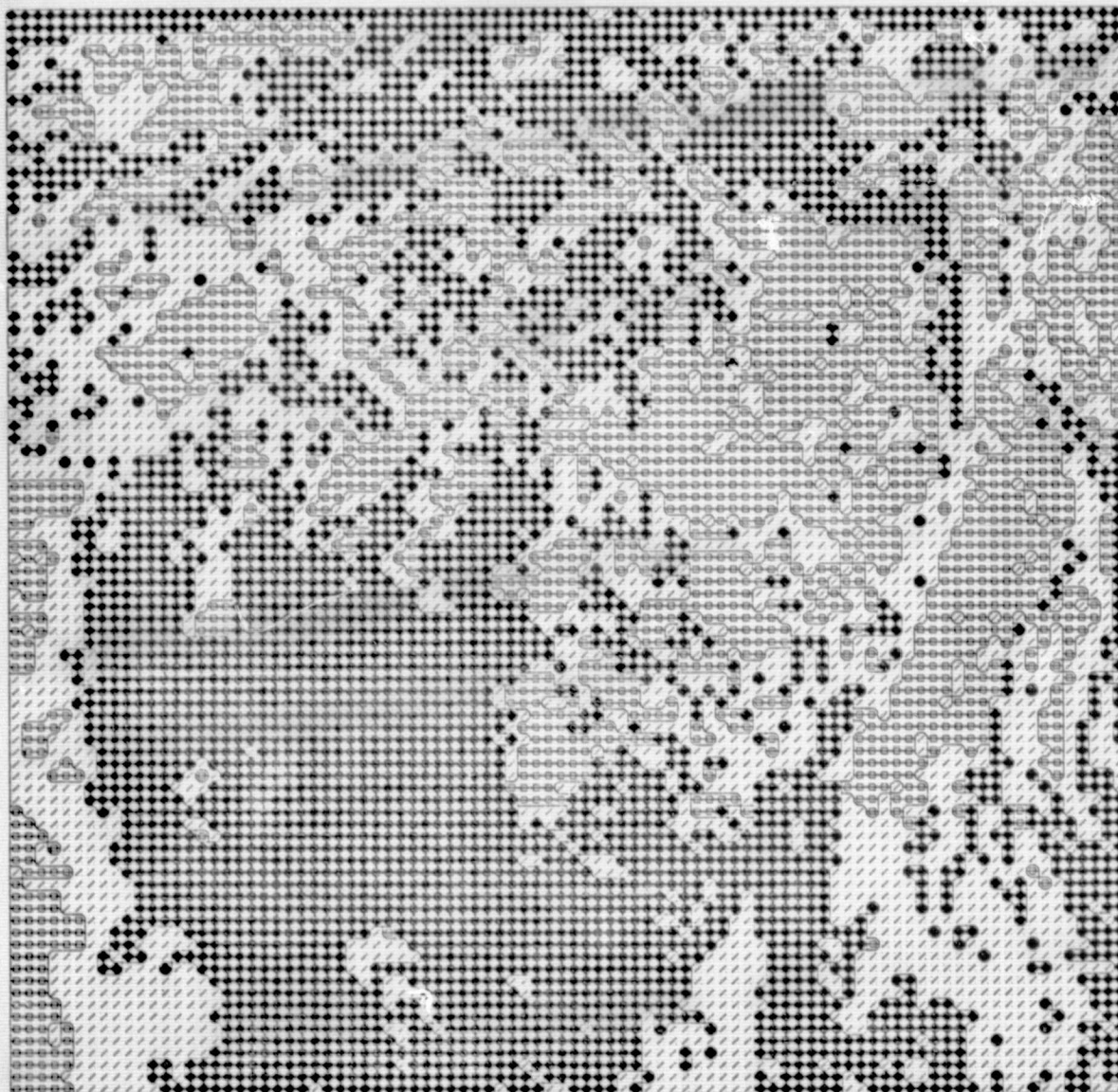
127

160

Figure 105

The Cloncurry Plains. Computer generated map showing an unsupervised classification in two groups of the spectral signatures of the colour composite of MSS bands 4, 5 and 7 of grid section 22 of the Cloncurry/Dobbyn frame. LANDSAT ID1152-00073: 22 December 1972.

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127

160

72

Figure 106

The Cloncurry Plains. Computer generated map showing unsupervised classification into three groups of the spectral signatures of the colour composite of MSS bands 4, 5 and 7 of grid section 22 of the Cloncurry-Dobbyn frame.
 LANDSAT I ID 1152-00073: 22 December 1972

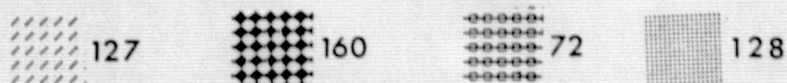
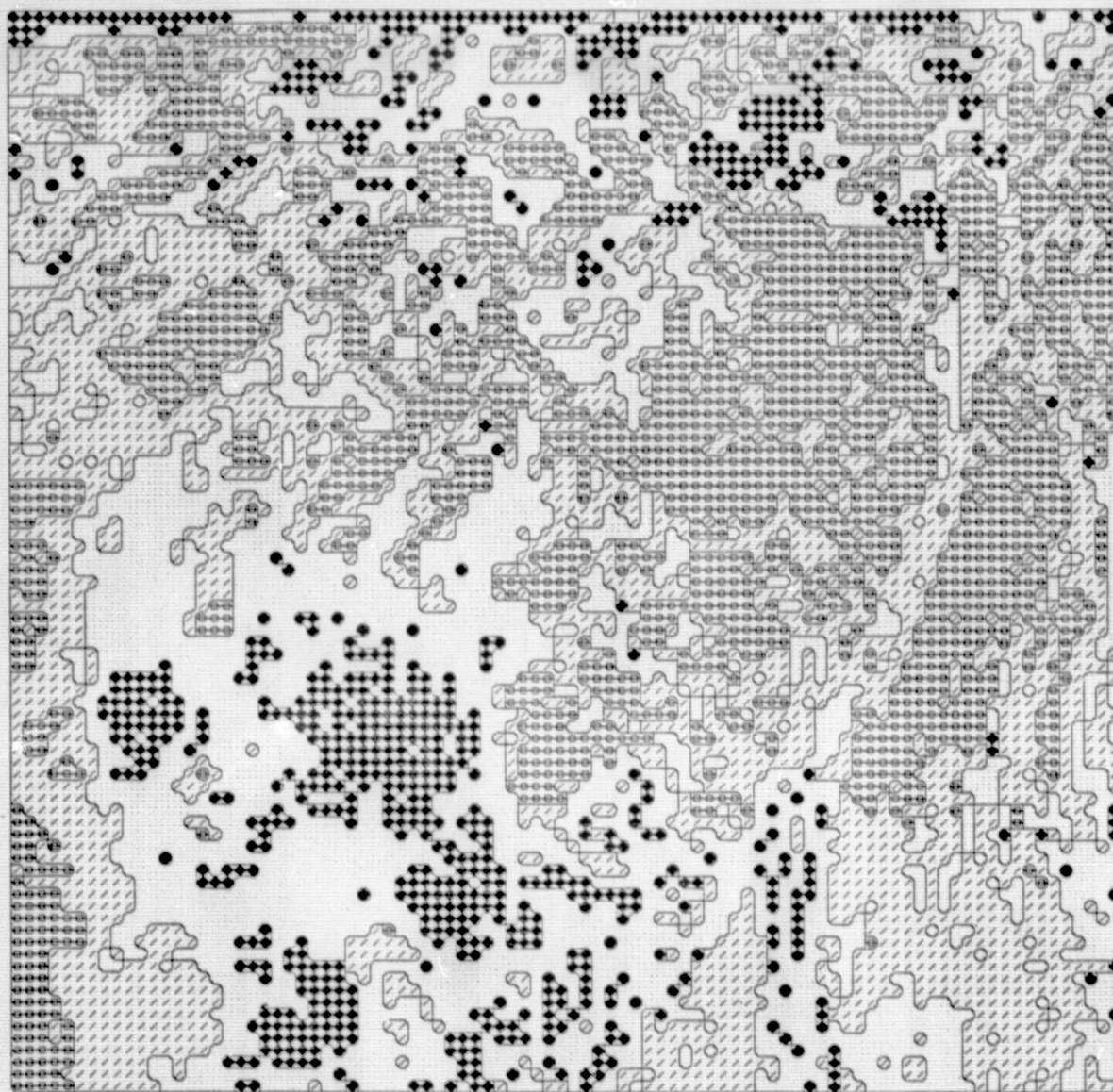


Figure 107 The Cloncurry Plains. Computer generated map showing unsupervised classification in 4 groups of the spectral signatures of the colour composite of MSS bands 4, 5 and 7 of grid section 22 of the Cloncurry-Dobbyn frame. LANDSAT 1 ID1152-00073: 22 December 1972.

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N. QUEENSLAND - ERTS BANDS 4,5,7
 CLASSIFIED BY POLYDIV : 30/10/74
 SHADINGS 127 160 72 128 0

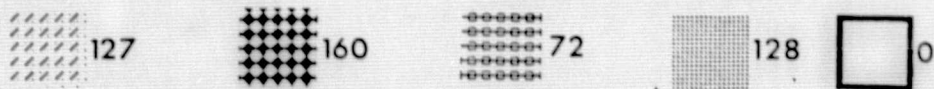
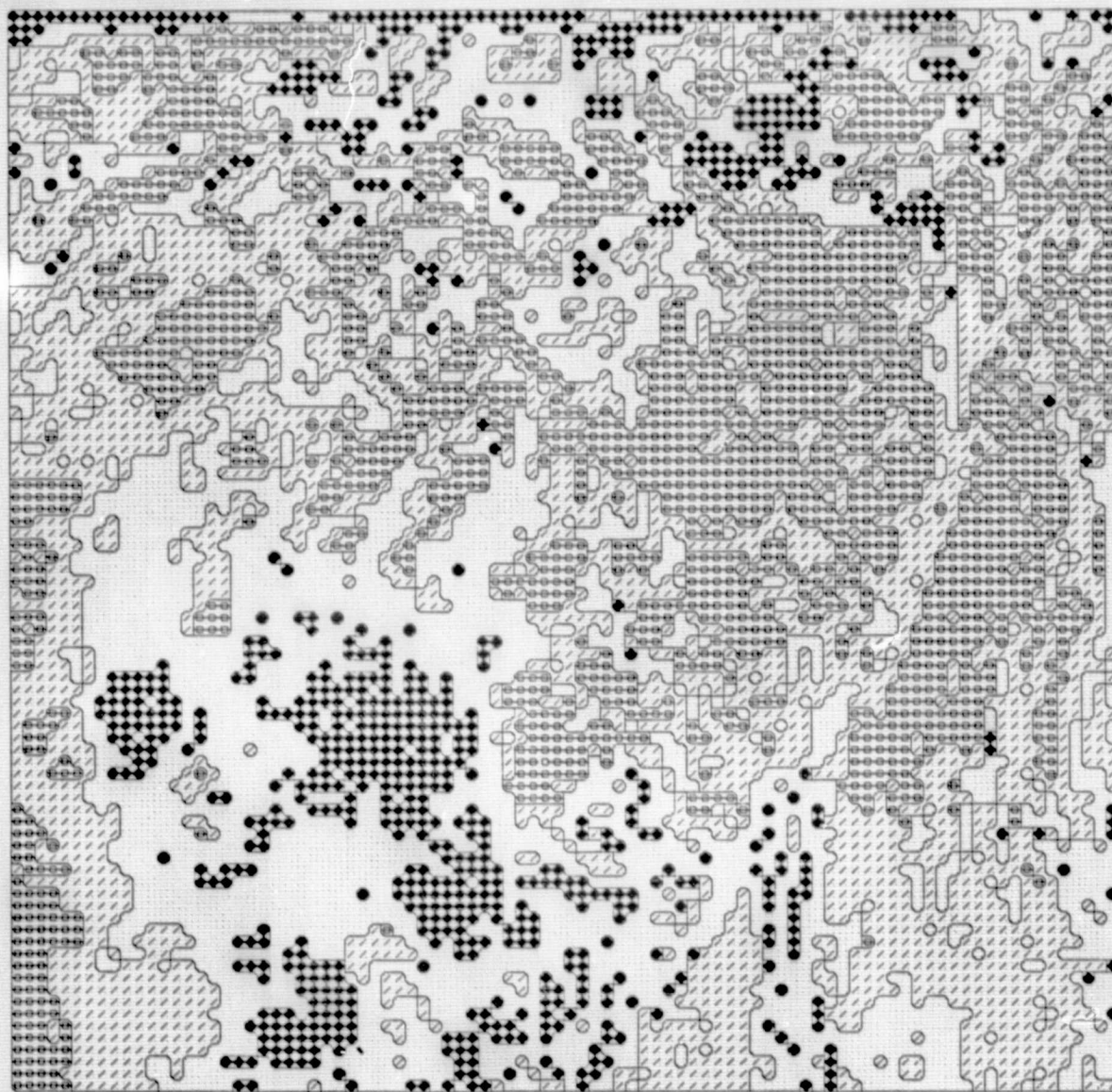


Figure 108

The Cloncurry Plains. Computer generated map showing supervised classification into five groups of the spectral signatures of the colour composite of MSS bands 4, 5 and 7 of grid section 22 of the Cloncurry-Dobbyn frame. LANDSAT I ID1152-00073: 22 December 1972.

N. QUEENSLAND - ERTS BANDS 4.5.7
 CLASSIFIED BY POLYDIV : 30/10/74
 SHADINGS 127 160 72 128 0 33

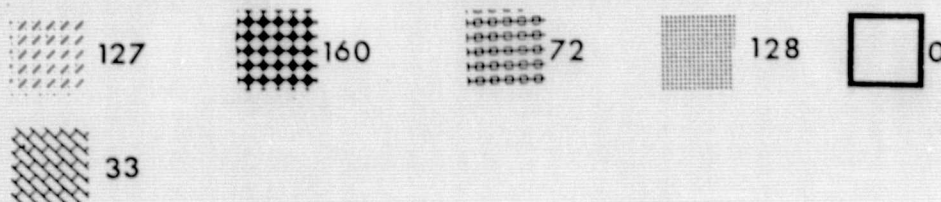
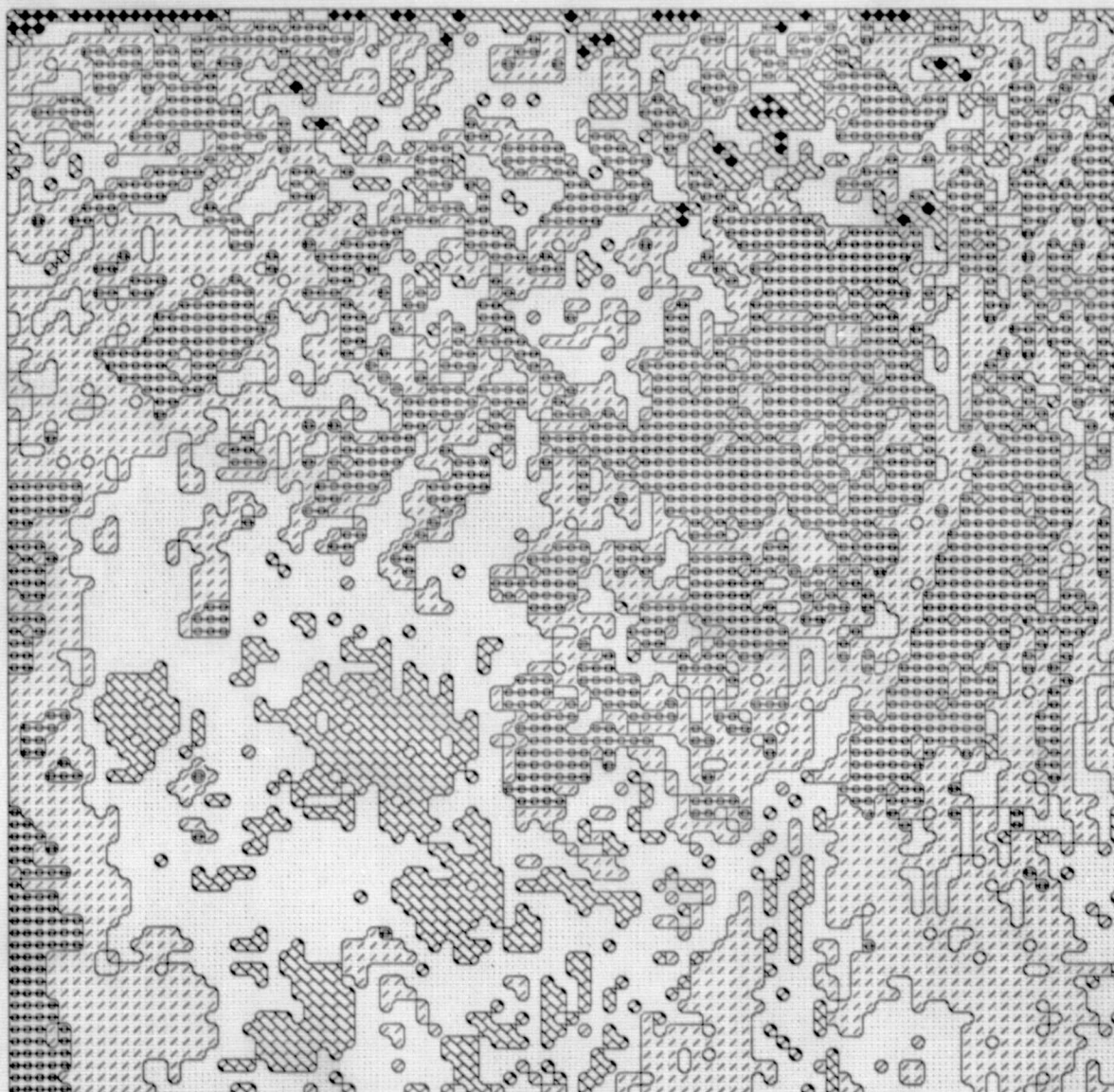


Figure 109

The Cloncurry Plains. Computer generated map showing an unsupervised classification into six groups of the spectral signatures of the colour composite of MSS bands 4, 5 and 7 of grid section 22 of the Cloncurry-Dobbyn frame. LANDSAT I ID1152-00073: 22 December 1972.

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N. QUEENSLAND - ERTS BANDS 4,5,7

CLASSIFIED BY POLYDIV : 30/10/74

SHADINGS 127 160 72 128 0 33 1

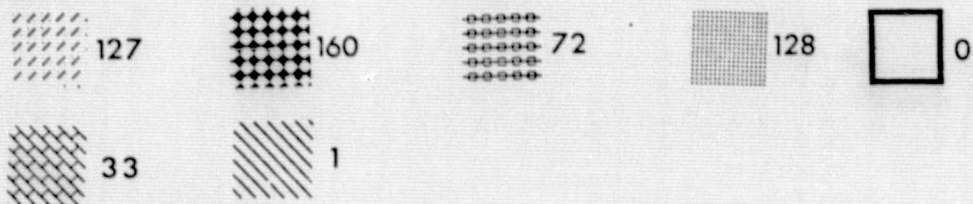
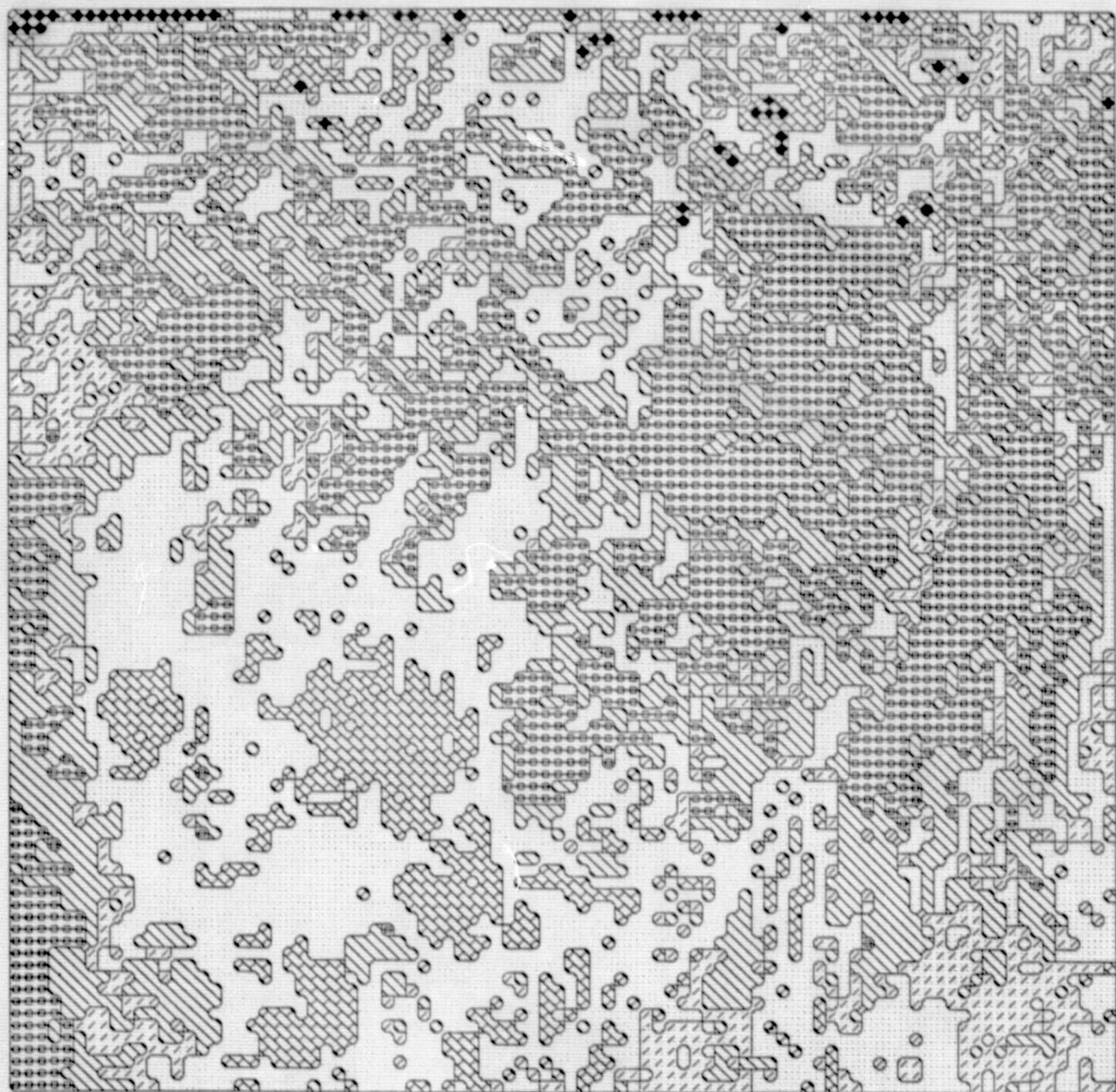


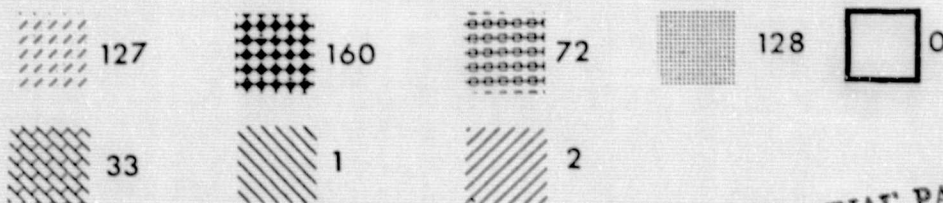
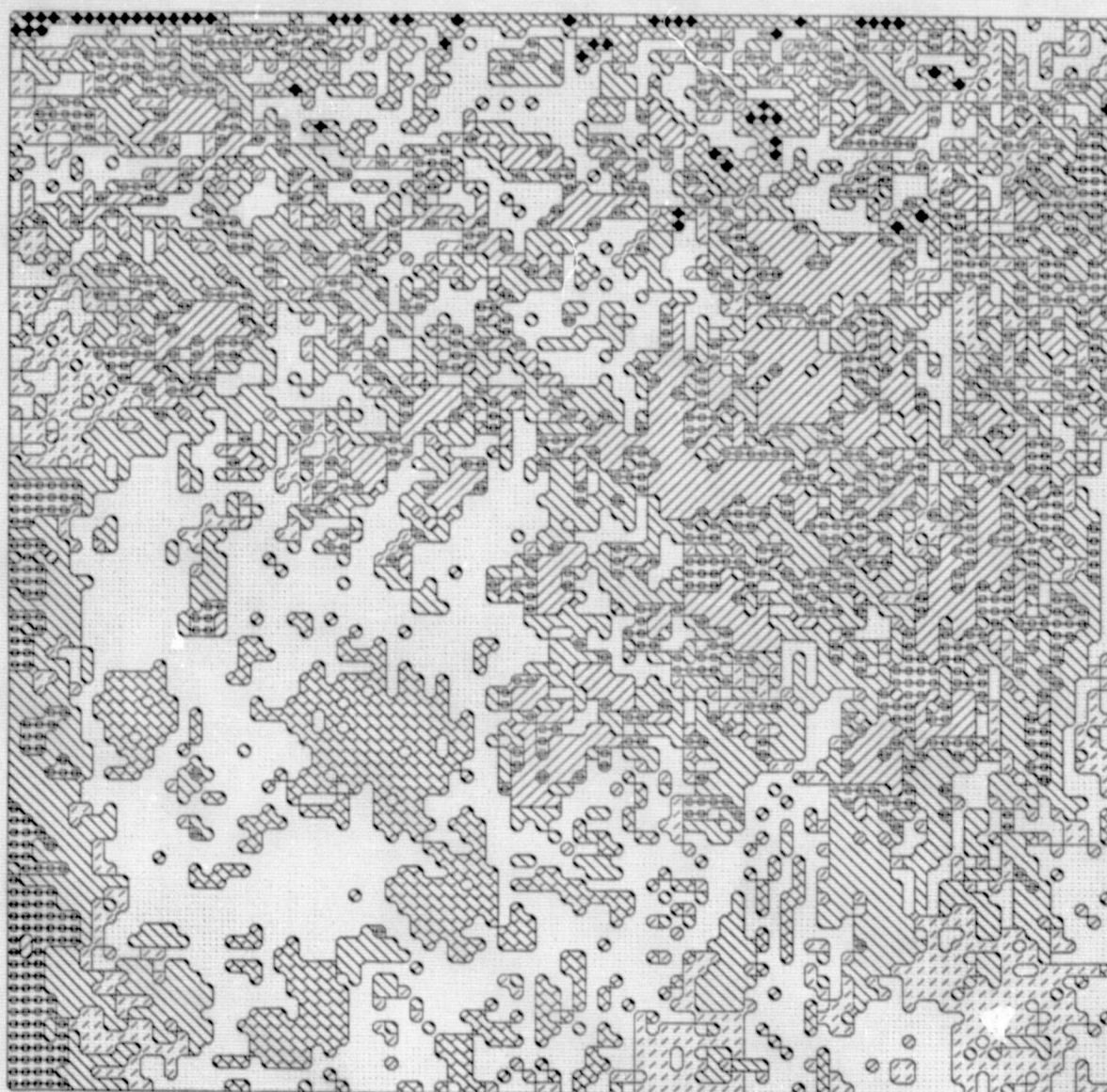
Figure 110

The Cloncurry Plains. Computer generated map showing an unsupervised classification into seven groups of the spectral signatures of the colour composite of MSS bands 4, 5 and 7 of grid section 22 of the Cloncurry-Dobbyn frame. LANDSAT I ID1152-00073: 22 December 1972.

N. QUEENSLAND - ERTS BANDS 4,5,7

CLASSIFIED BY POLYDIV : 30/10/74

SHADINGS 127 160 72 128 0 33 1 2



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Figure 111

The Cloncurry Plains. Computer generated map showing unsupervised classification into eight groups of the spectral signatures recognised on the colour composite of MSS bands 4, 5 and 7 of grid section 22 of the Cloncurry-Dobbyn frame. LANDSAT 1 imagery: ID 1152-00073: 22 December 1972.

MARY KATHLEEN WEST 2039-23555 2/3/75 4x4 PIXELS JOB 6/047 ■ABUT ■SELPAR 1 2 4
CLASSIFIED BY POLYDIV : 26/04/77

OP	SHADING	POINTS
1	ABCDEFGHIJK	2591
2	IJK	2803

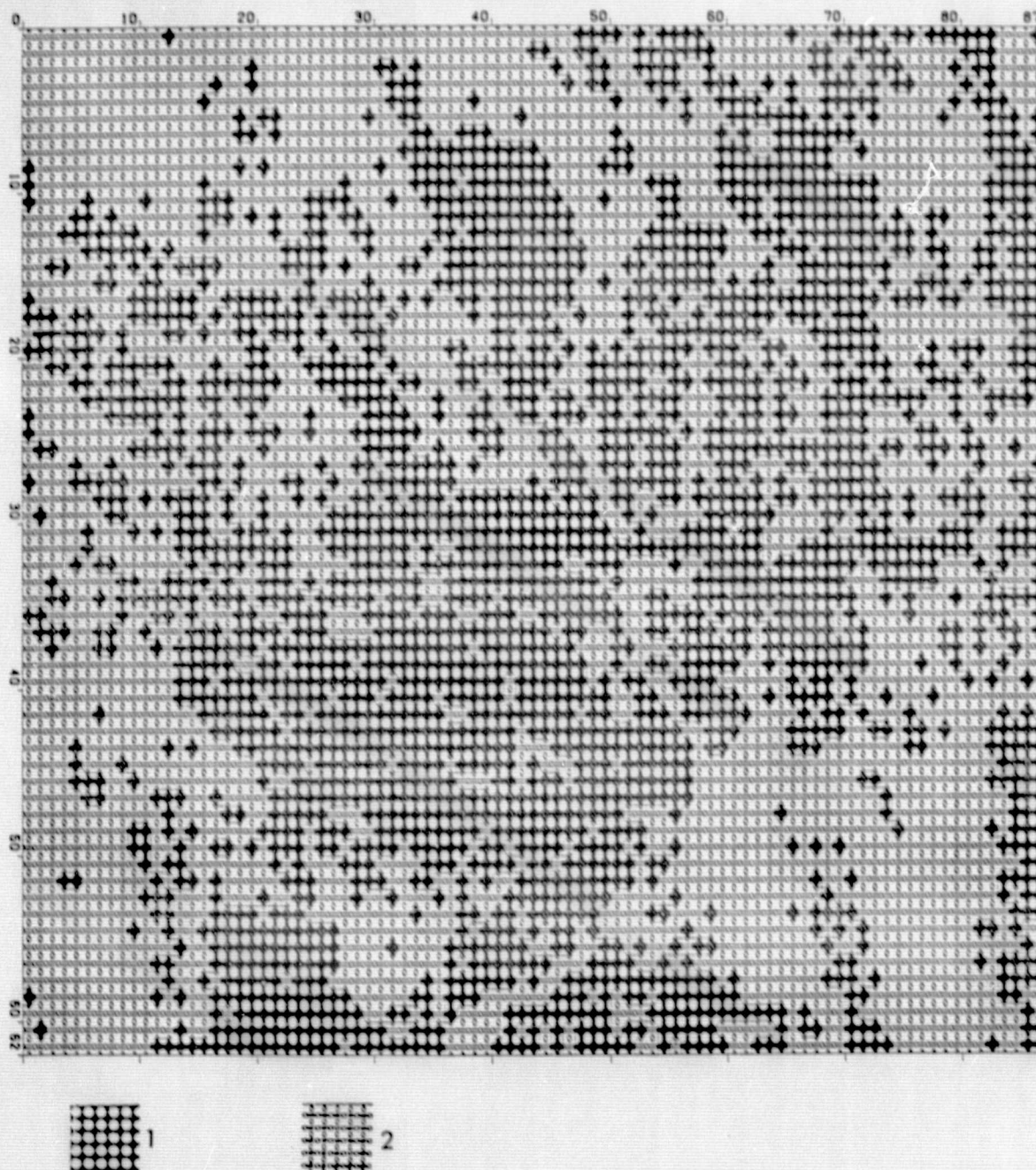
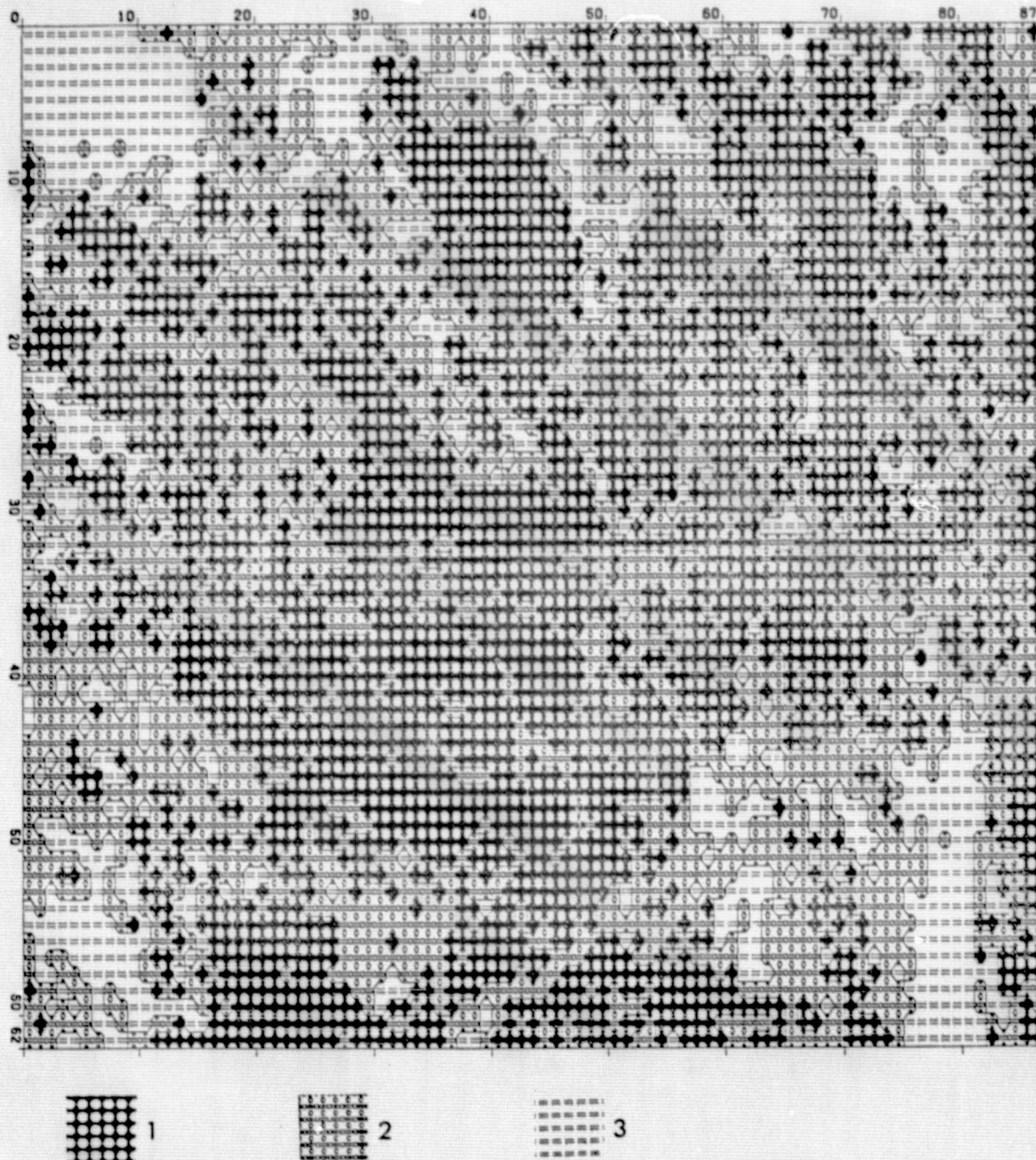


Figure 112

The Mary Kathleen Area. Computer generated map showing unsupervised classification into two groups of the spectral signatures recognised on the colour composite of MSS bands 4, 5 and 7 of LANDSAT 2 imagery: ID 2039-23555: 2 March 1975.

MARY KATHLEEN WEST 2039-23555 2/3/75 4x4 PIXELS JOB 6/047 ■ABUT ■SELPAR 1 2 4
CLASSIFIED BY POLYDIV : 26/04/77

GP SHADING	POINTS
1 ABCDEFGHIJK	2591
2 IJK	1892
3 HI	911



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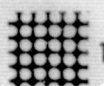
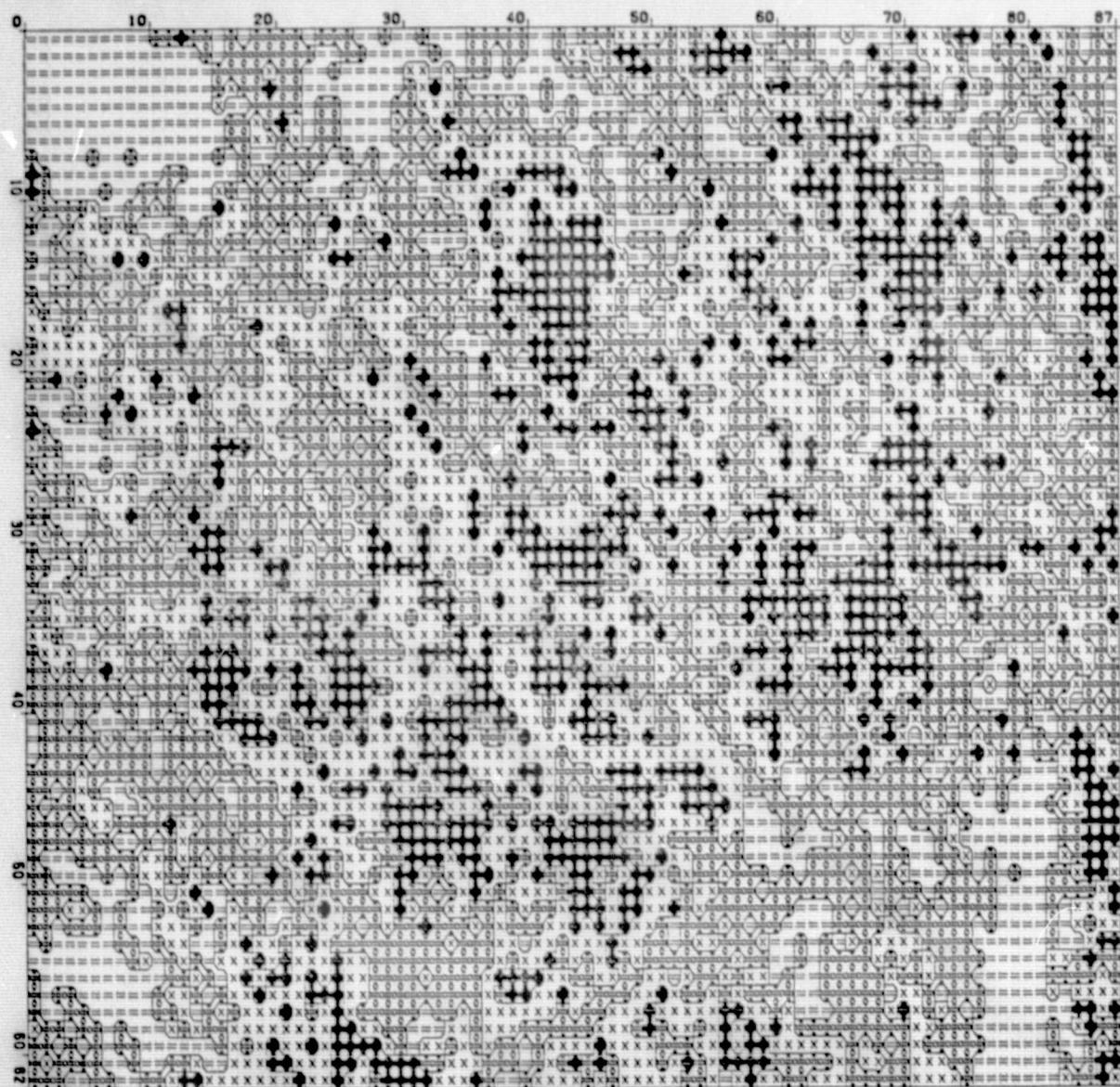
Figure 113

The Mary Kathleen Area. Computer generated map showing unsupervised classification into three groups of the spectral signatures recognised on the colour composite of MSS bands 4, 5 and 7 of LANDSAT 2 imagery: ID 2039-23555: 2 March 1975.

MARY KATHLEEN WEST 2039-23555 2/3/75 4:4 PIXELS JOB 6/047 ABUT
CLASSIFIED BY POLYDIV : 26/04/77

SELPAR 1 2 4

OF SHADING	POINTS
1 ABCDEFGHIJK	910
2 IJK	1892
3 MI	911
4 EF	1681



1



2



3



4

Figure 114

The Mary Kathleen Area. Computer generated map showing unsupervised classification into four groups of the spectral signatures recognised on the colour composite generated from MSS bands 4, 5 and 7 of LANDSAT 2 imagery: ID 2039-23555: 2 March 1975.

MARY KATHLEEN WEST 2039-23555 2/3/75 4*4 PIXELS JOB 6/047

*ABUT

11 GROUPS : FIELD MAP FOR TSI MARY KATHLEEN WEST 2039-23555 : DATE 04/05/77

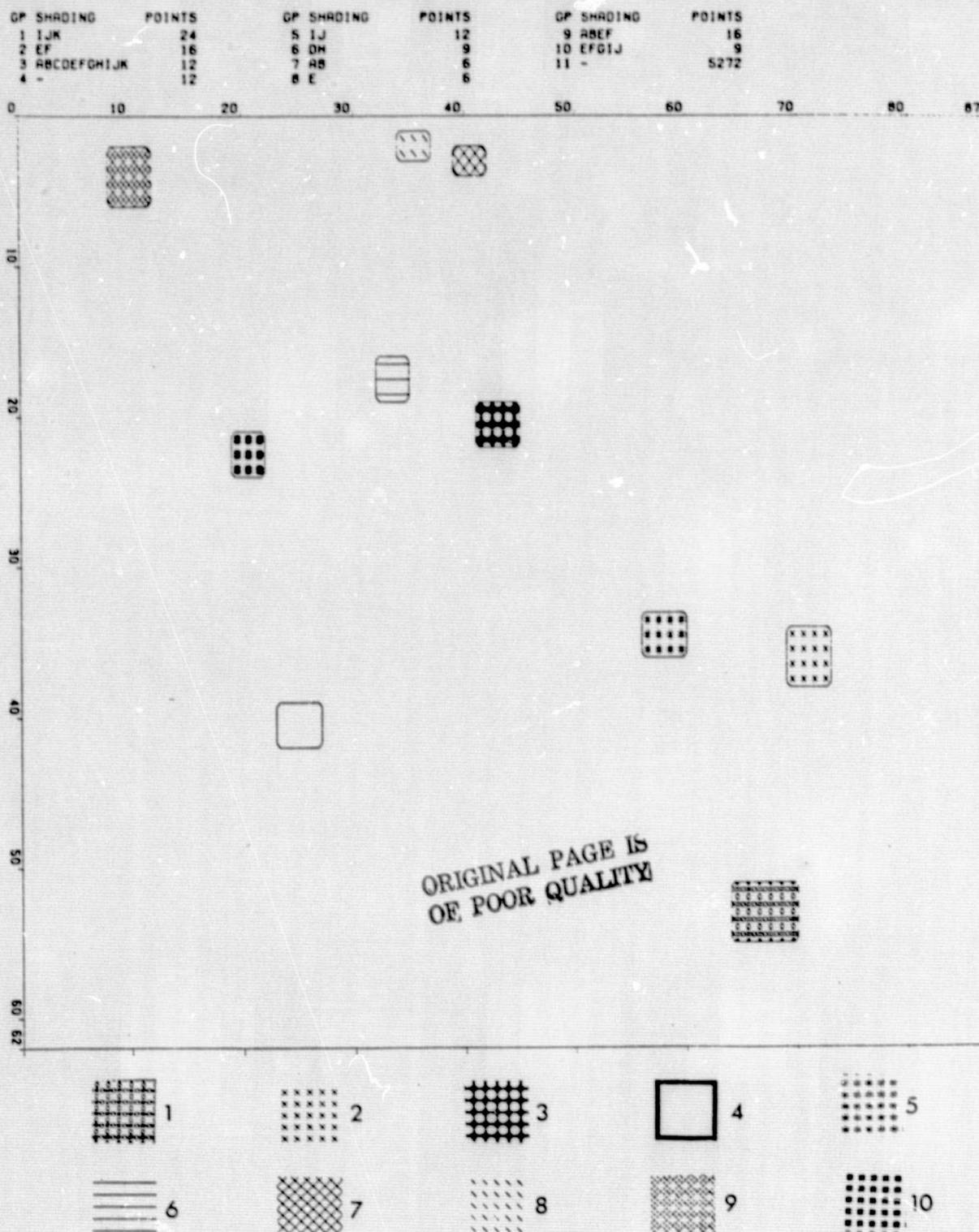


Figure 115

The Mary Kathleen Area. Training areas used for computer generated map showing supervised classification into ten groups of the spectral signatures recognised on the colour composite generated from MSS bands 4, 5 and 7 of LANDSAT 2 imagery: ID 2039-23555: 2 March 1975.

10 GROUPS-SOUPED NO BIN 04/05/77 FROM TSI -MARY KATHLEEN WEST 2039-23555

GP SHADING	POINTS	GP SHADING	POINTS	GP SHADING	POINTS
1 IJK	633	5 IJ	941	9 ABEF	152
2 EF	534	6 DH	1051	10 EFGIJ	343
3 ABCDEFGHIJK	350	7 AB	135		
4 -	650	8 E	605		

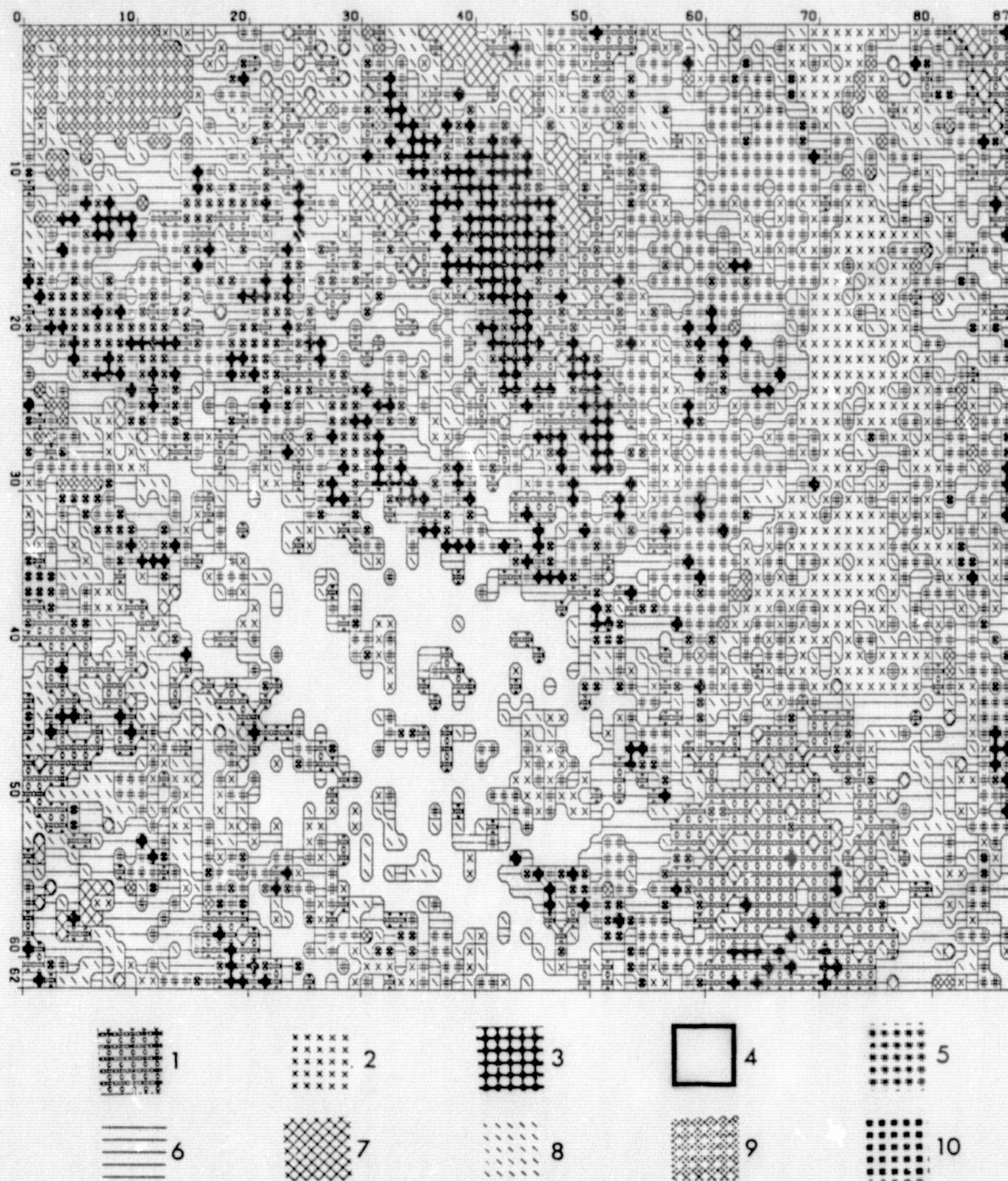
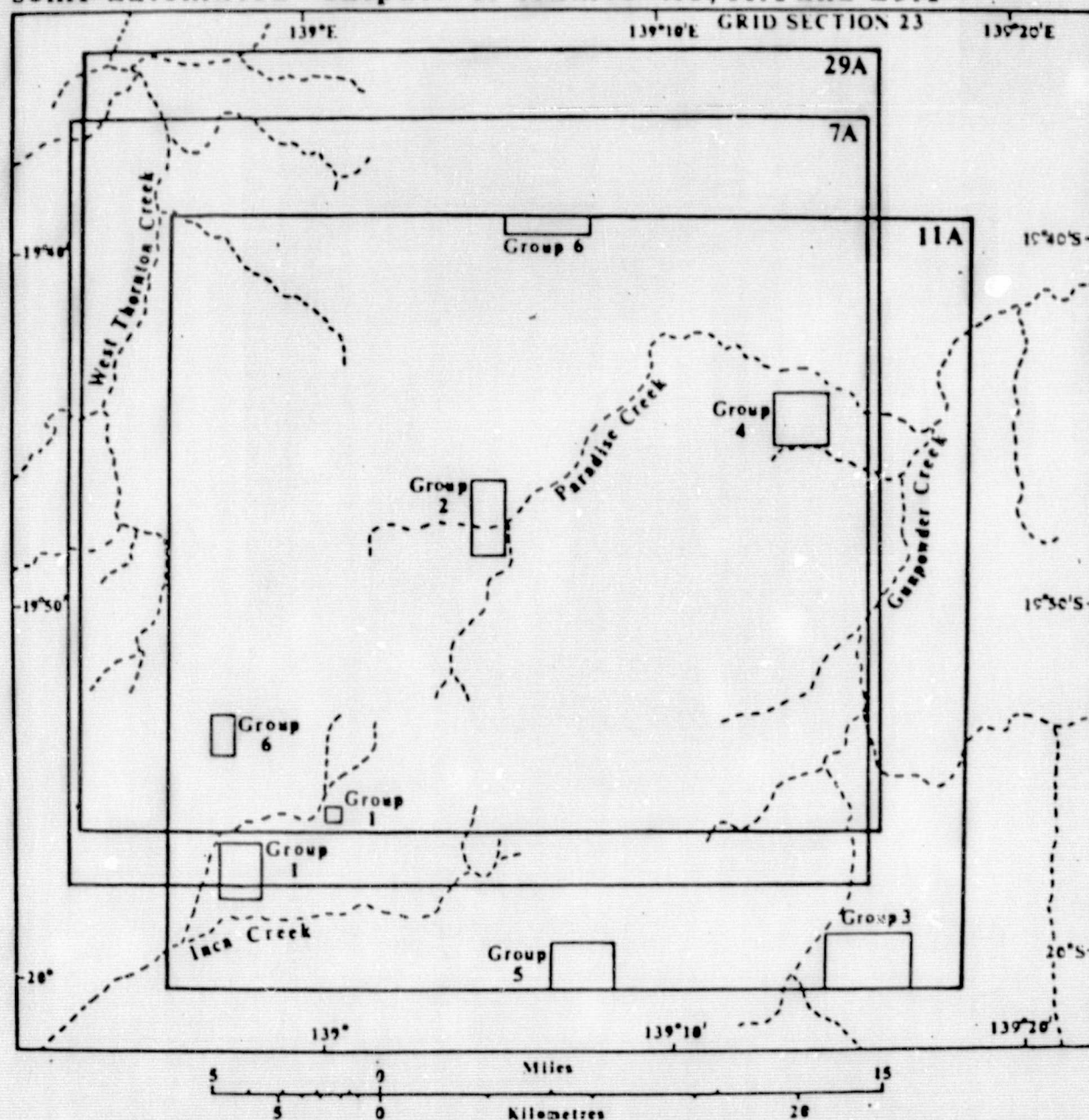


Figure 116

The Mary Kathleen Area. Computer generated map showing supervised classification into ten groups of the spectral signatures recognised on the colour composite generated from MSS bands 4, 5 and 7 of LANDSAT 2 imagery: ID 2039-23555: 2 March 1975.

LADY ANNIE LANDSAT 2

Location of training sets for 6 groups and areas scanned for semi-automated outputs of frames 7A, 11A and 29A



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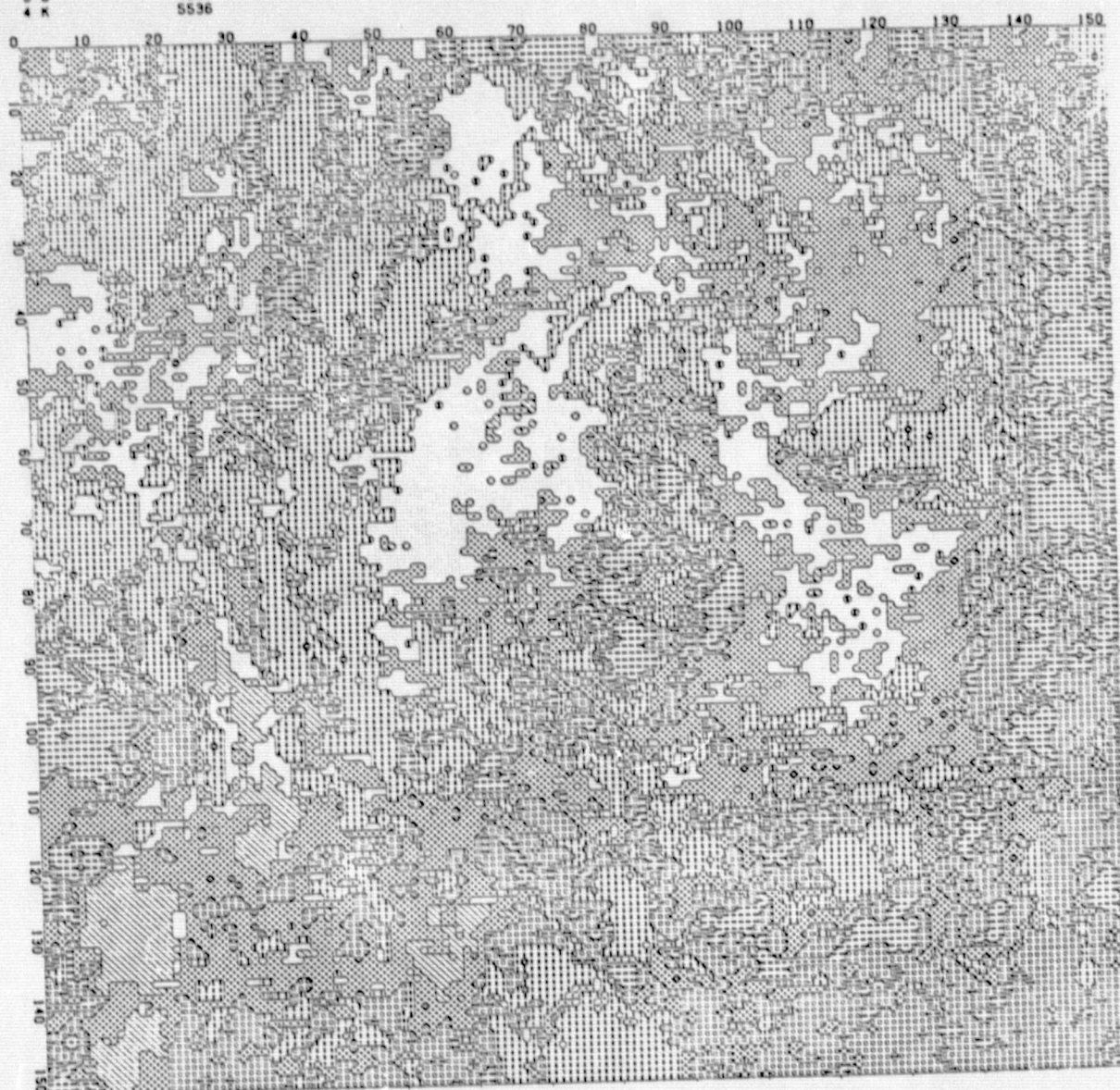
Figure 117

The Lady Annie Area. Training areas used for computer generated map showing supervised classification into six groups of the spectral signatures recognised on the colour composite generated from MSS bands 4, 5 and 7 of grid section 23 of the Lady Annie Mammoth frame. LANDSAT 2 imagery: ID 2059-00012: 22 March 1975. Areas scanned on LANDSAT frames for 22 March 1975, 18 September 1975 and 10 November 1975 shown.

ERTS FRAME 11A

6 GROUPS-SOUPED NO BIN 06/12/77 FROM TSI -ERTS FRAME 11A LADY ANNIE AREA

GP SHADING	POINTS	GP SHADING	POINTS
1 A	545	5 J	6047
2 H	3402	6 I	2436
3 G	4534		
4 K	5536		



1



2



3



4



5



6

Figure 118

The Lady Annie Area. Computer generated map showing supervised classification into six groups of the spectral signatures recognised on the colour composite generated from MSS bands 4, 5 and 7 of grid section 23 of the Lady Annie-Mammoth frame. LANDSAT 2 imagery: ID 2059-00012:22 March 1975.

ERTS FRAME 7A

4 GROUPS-SOUPED NO BIN 20/08/76 FROM TSI -FRAME ERTS 7A SET 41

GP SHADING	POINTS
1 A	2940
2 H	9161
3 K	6701
4 I	3698

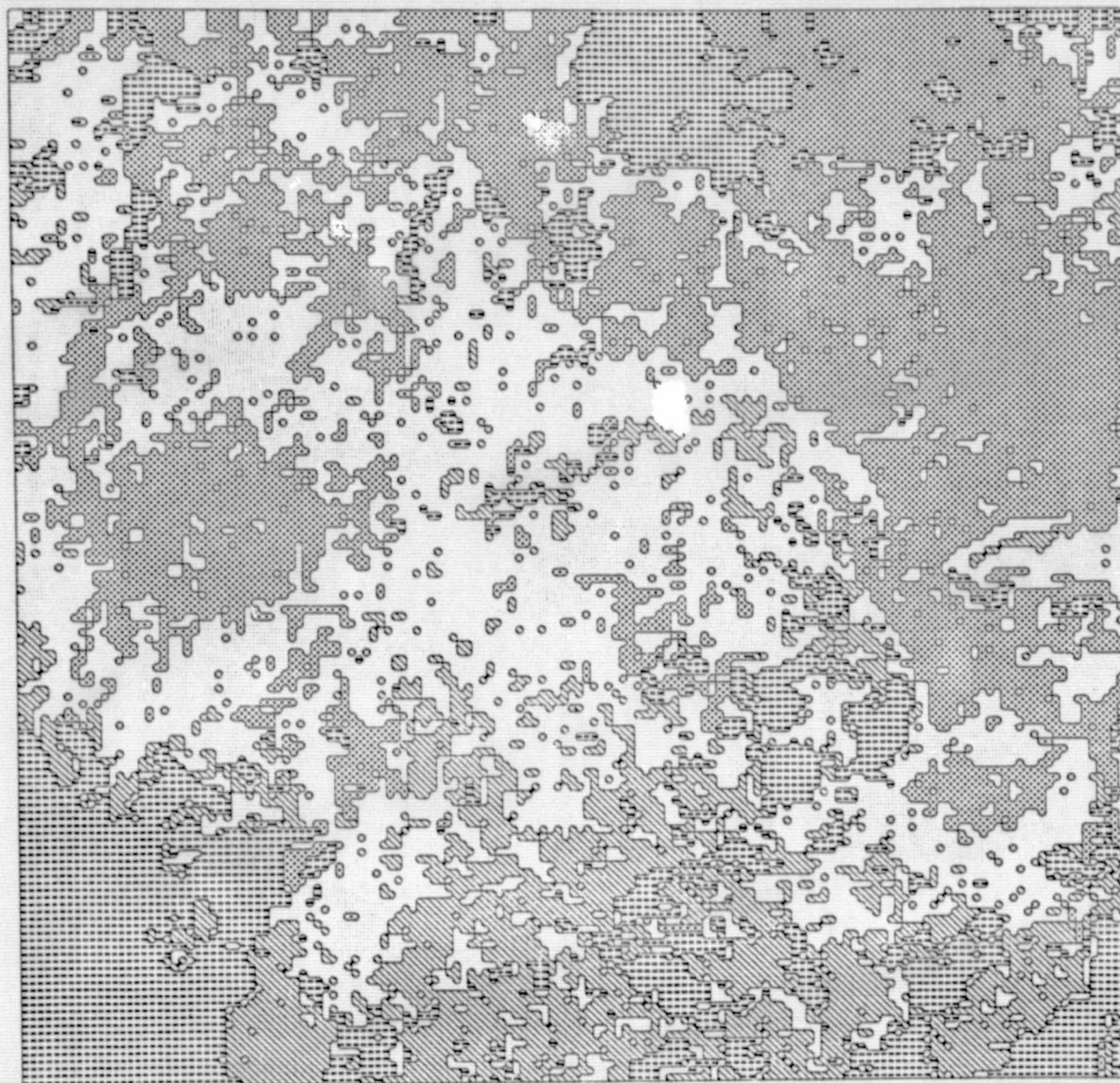


Figure 119

The Lady Annie Area. Computer generated map showing supervised classification of the spectral signatures on the colour composite generated from MSS bands 4, 5 and 7 of grid section 23 of the Lady Annie-Mount Isa frame. LANDSAT 2 : ID 2292-23594: 10 November 1975. Classification based on training areas designated on colour composite for 22 March 1975.

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ERTS FRAME 29A

5 GROUPS-SOUPED CUTOFF 20.000 FROM TSI -FRAME ERTS 29A SET6

GP SHADING	POINTS	GP SHADING	POINTS
1 A	4737	5 -	1277
2 H	8092		
3 K	2738		
4 I	5656		

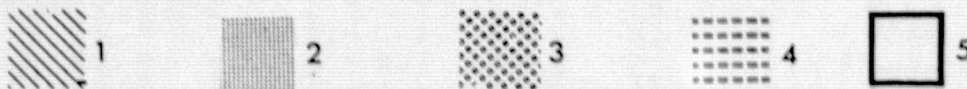
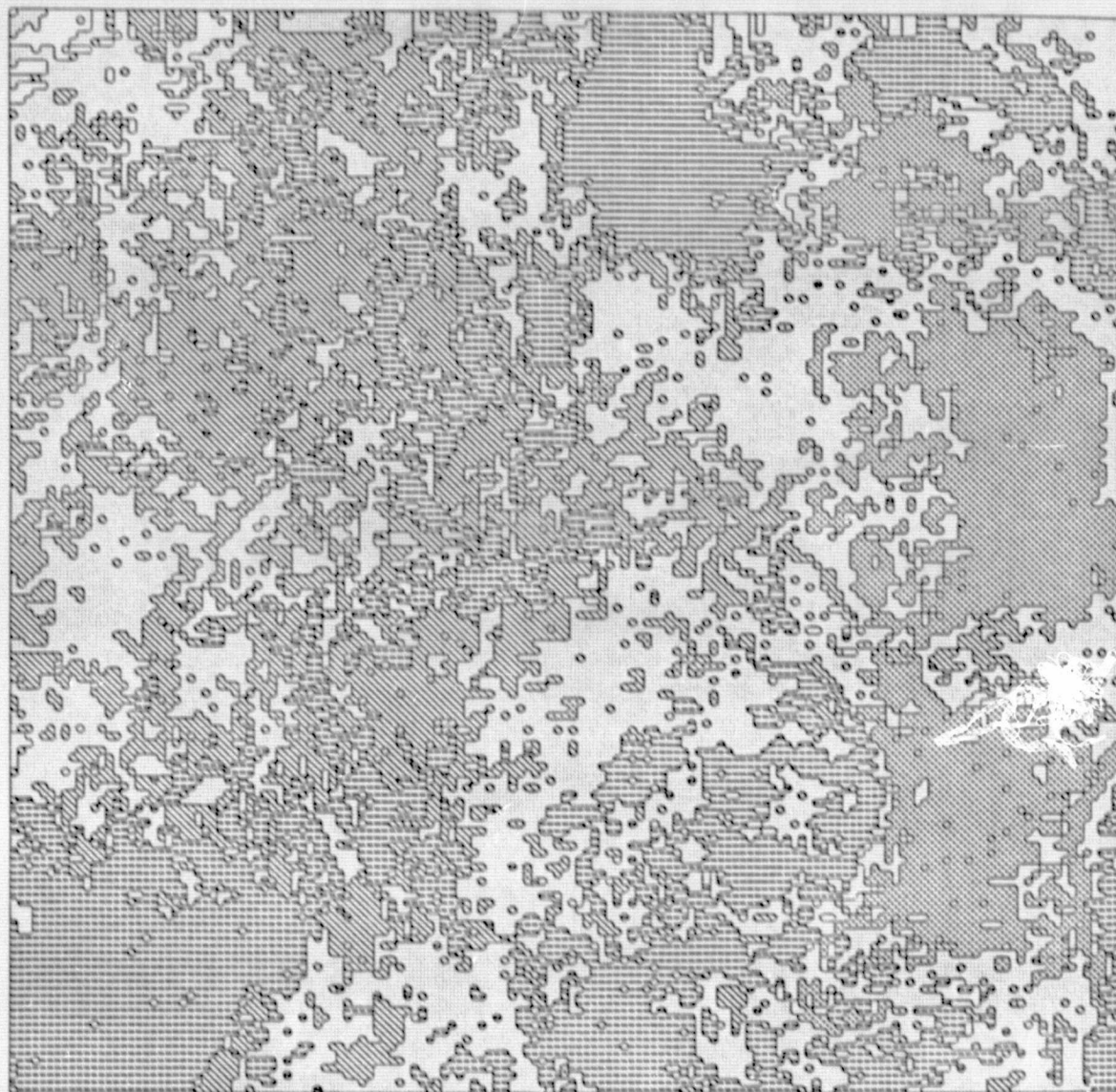


Figure 120

The Lady Annie Area. Computer generated map showing supervised classification of the spectral signatures on the colour composite generated from MSS bands 4, 5 and 7 of grid section 23 of the Mount Gordon - Lady Annie frame. LANDSAT 2 : ID 2239-00001: 18 September 1975. Classification based on training areas designated on colour composite for 22 March 1975.

ERTS FRAME 11A

11 GROUPS : FIELD MAP FOR TSI ERTS FRAME 11A LADY ANNIE ARE : DATE 18/10/77

GP SHADING	POINTS	GP SHADING	POINTS	GP SHADING	POINTS
1 AB	156	5 F	42	9 FD	24
2 EFGIJ	99	6 A	65	10 I	63
3 ABCDEFGHI	81	7 D	67	11 -	21792
4 H	45	8 B	66		

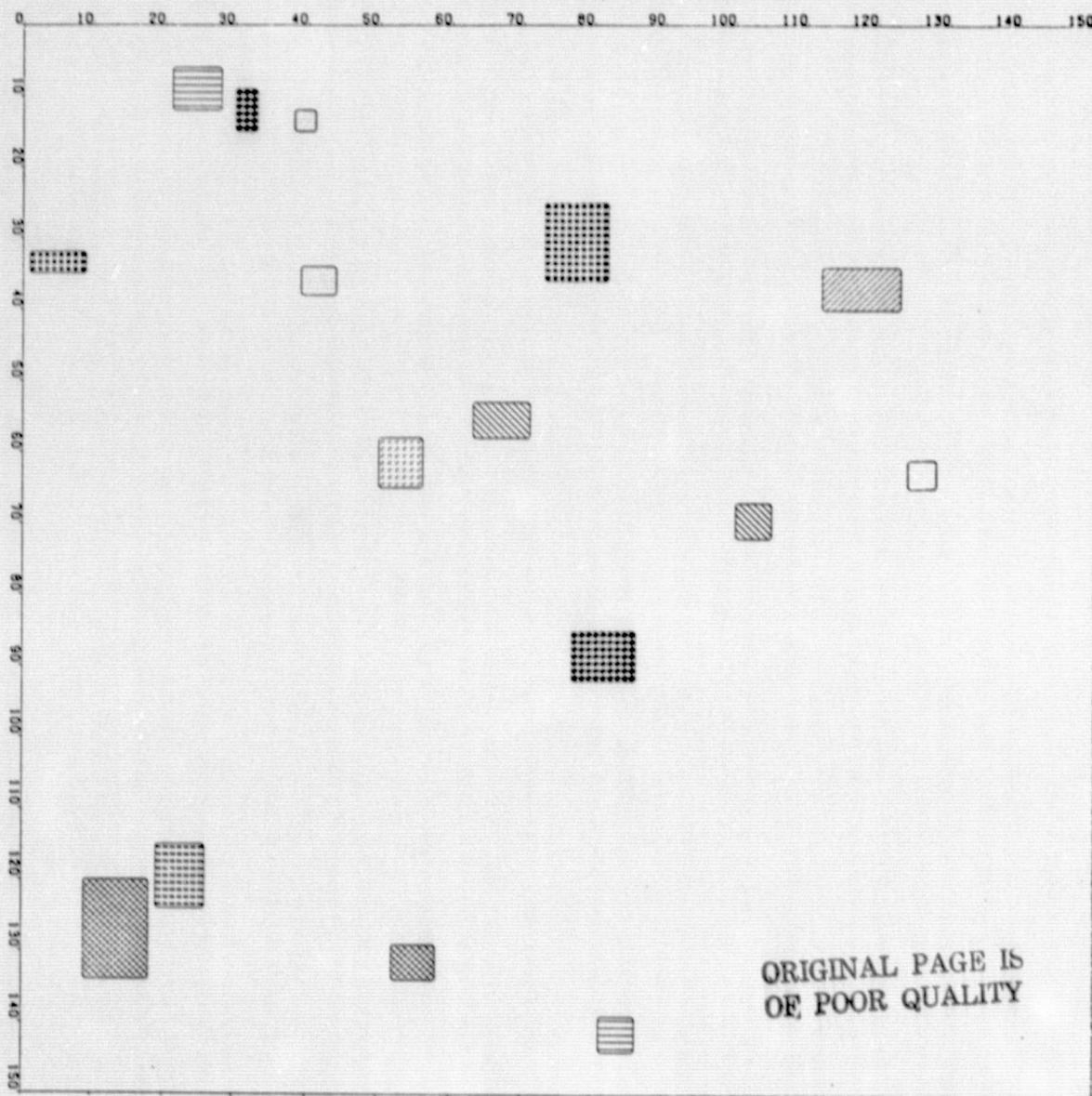


Figure 121

The Lady Annie Area. Training areas used for computer generated map showing supervised classification into ten groups of the spectral signatures recognised on the colour composite generated from MSS bands 4, 5 and 7 of grid section 23 of the Lady Annie-Mammoth frame. LANDSAT 2 : ID 2059-00012: 22 March 1975.

ERTS FRAME 11A

10 GROUPS-SOUPED NO BIN 18/10/77 FROM TSI -ERTS FRAME 11A LADY ANNIE ARE

GP SHADING	POINTS	GP SHADING	POINTS	GP SHADING	POINTS
1 AB	492	5 F	1435	9 FG	1413
2 EFGIJ	1892	6 A	1183	10 I	2205
3 ABCDEFGHI	6433	7 D	3734		
4 H	2042	8 B	1671		

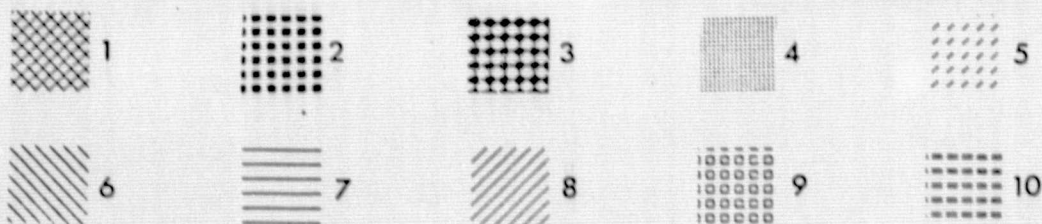
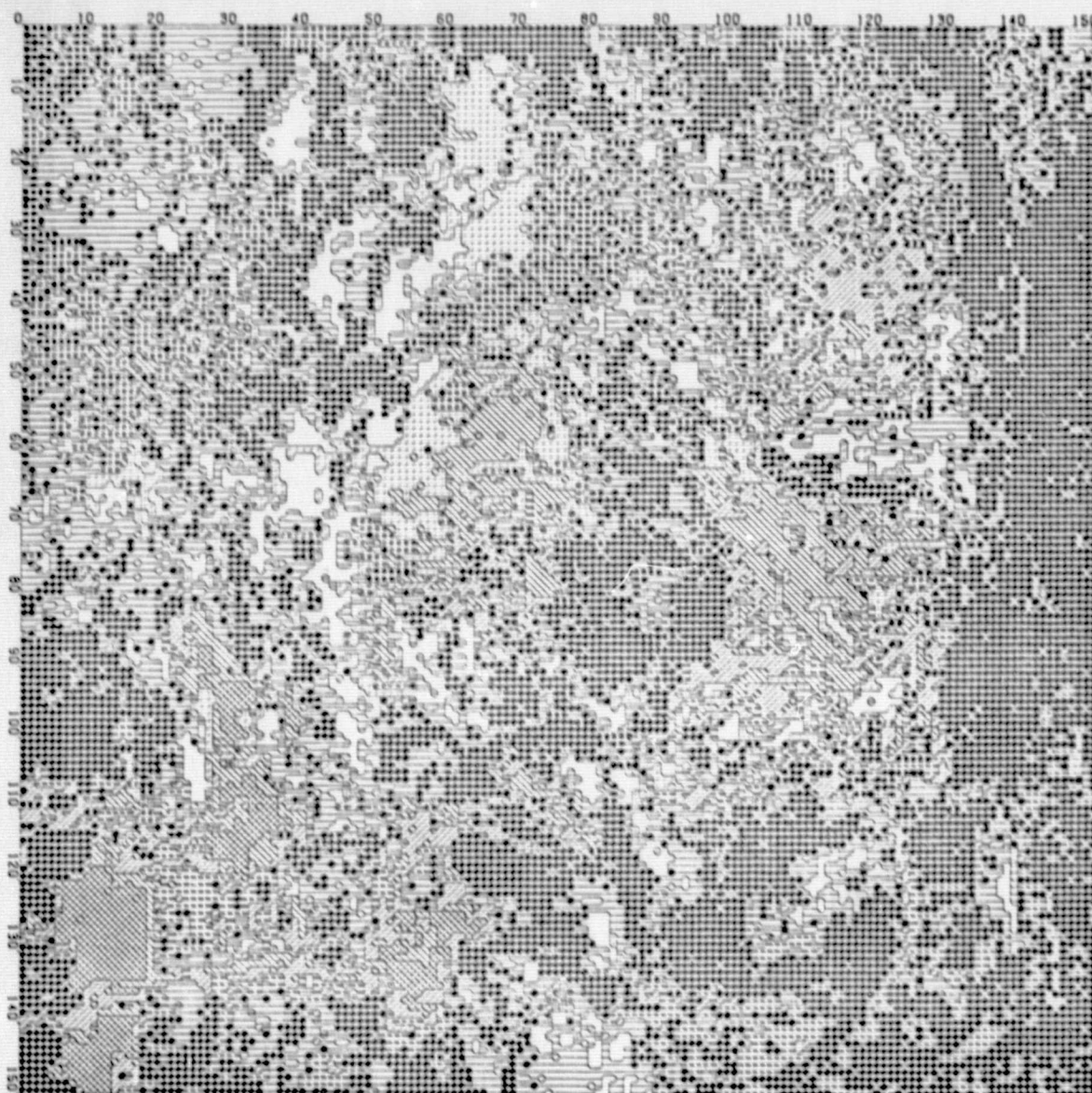


Figure 122

The Lady Annie Area. Computer generated map showing supervised classification into ten groups of the spectral signatures recognised on the colour composite generated from MSS bands 4, 5 and 7 of grid section 23 of the Lady Annie-Mammoth frame. LANDSAT 2 : ID 2059-00012: 22 March 1975.

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ERTS FRAME 11A

10 GROUPS-SOUPED NO BIN 31/10/77 FROM TSI -ERTS FRAME 11A LADY ANNIE ARE

GP SHADING	POINTS	GP SHADING	POINTS	GP SHADING	POINTS
1 ABCDEFGHIJK	492	5 -	1435	9 -	1413
2 -	1892	6 -	1183	10 -	2205
3 -	6433	7 -	3734		
4 -	2042	8 -	1671		

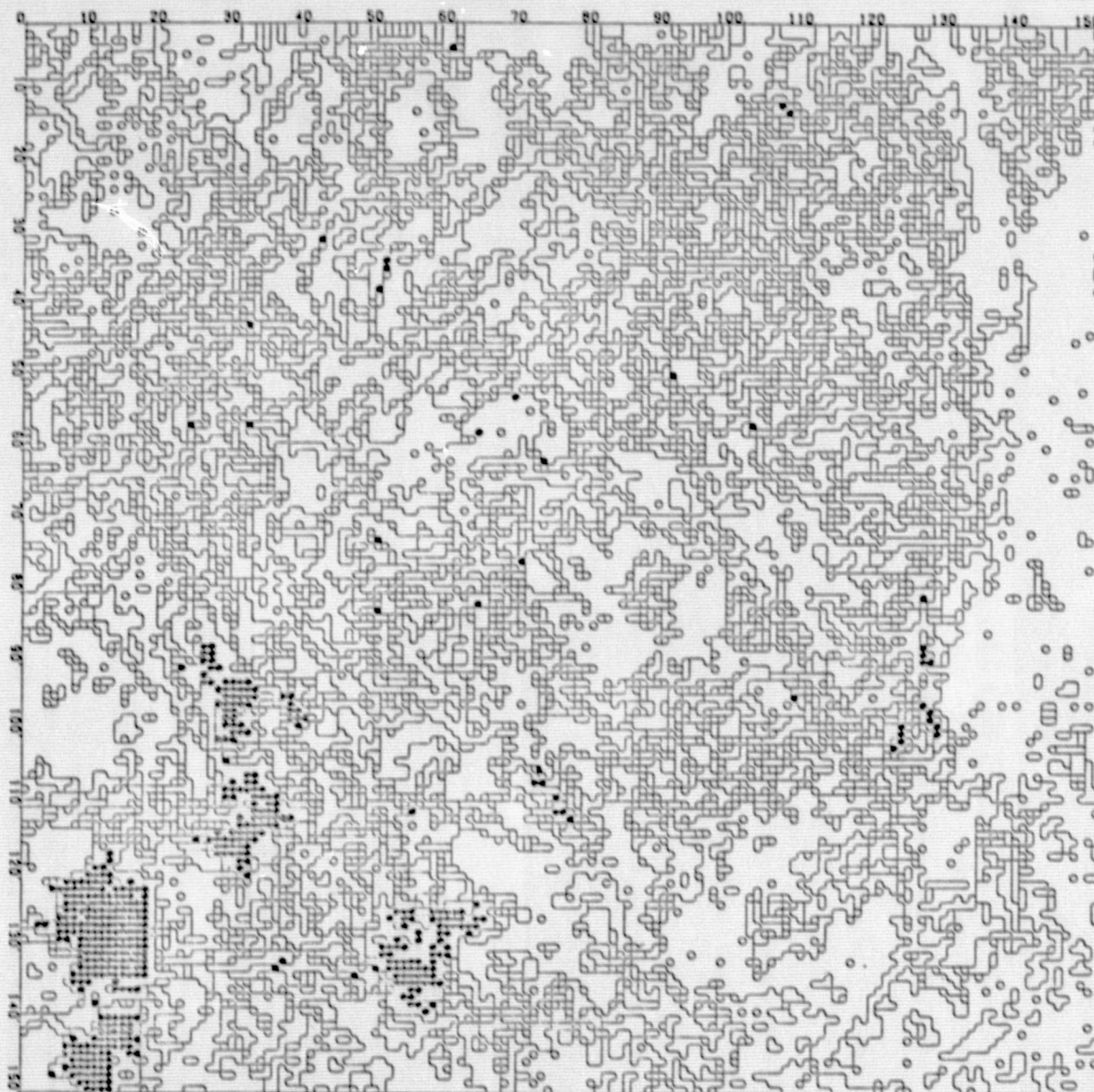


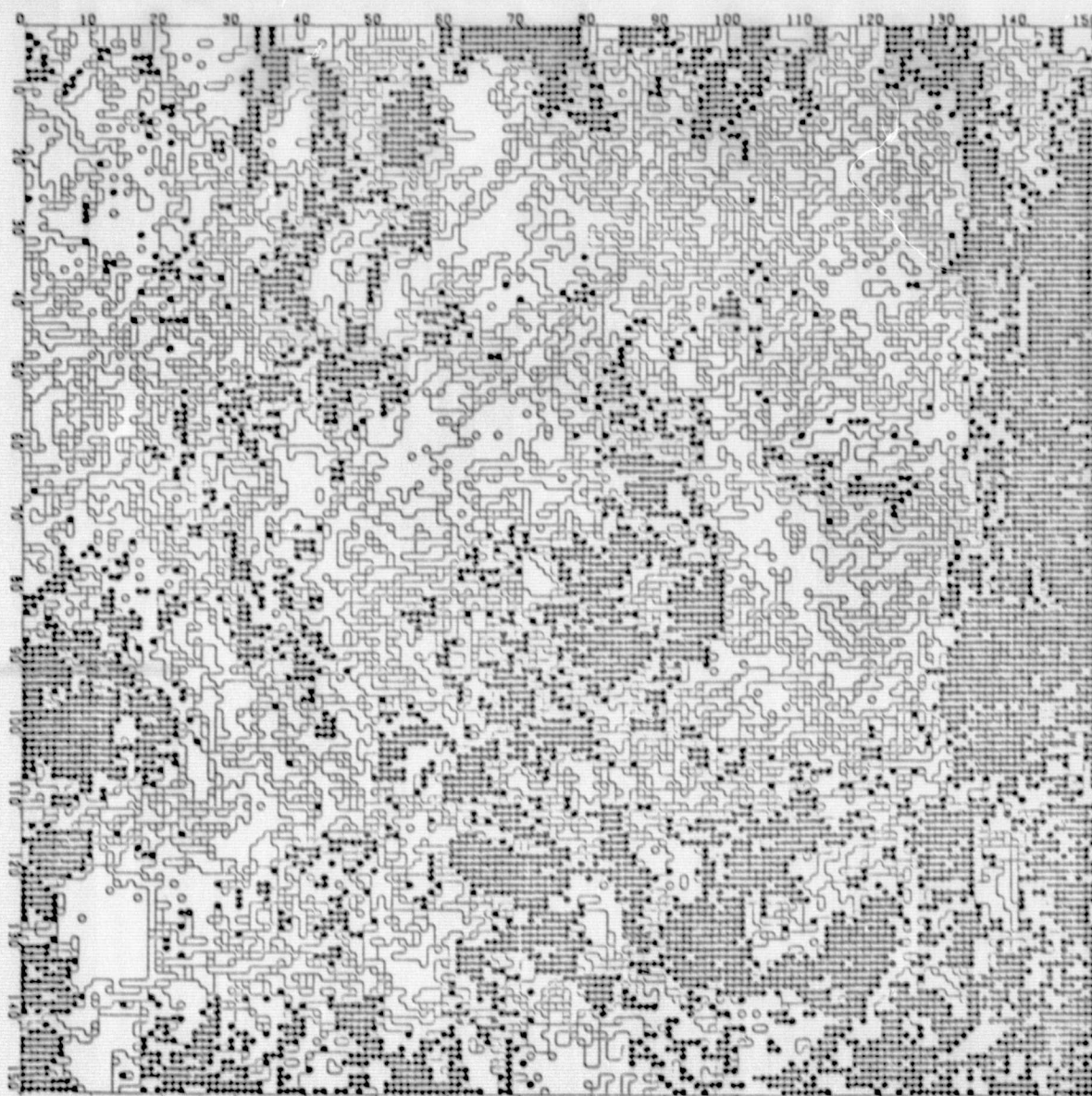
Figure 123

The Lady Annie Area. Computer generated map showing class 1 of the supervised classification into ten groups of the spectral signatures on the colour composite generated from MSS bands 4, 5 and 7 of grid section 23 of the Lady Annie-Mammoth frame. LANDSAT 2: ID 2059-00012: 22 March 1975.

ERTS FRAME 11A

10 GROUPS-SOUPED NO BIN 31/10/77 FROM TSI -ERTS FRAME 11A LADY ANNIE ARE

GP SHADING	POINTS	GP SHADING	POINTS	GP SHADING	POINTS
1 -	492	5 -	1435	9 -	1413
2 -	1892	6 -	1183	10 -	2205
3 ABCDEFGHIJK	6433	7 -	3734		
4 -	2042	8 -	1671		



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Figure 125

The Lady Annie Area. Computer generated map showing class 3 of the supervised classification into ten groups of the spectral signatures on the colour composite generated from MSS bands 4, 5 and 7 of grid section 23 of the Lady Annie-Mammoth frame. LANDSAT 2: ID 2059-00012: 22 March 1975.

ERTS FRAME 11A

10 GROUPS-SOUPED NO BIN 31/10/77 FROM TSI -ERTS FRAME 11A LADY ANNIE ARE

GP SHADING	POINTS	GP SHADING	POINTS	GP SHADING	POINTS
1 -	492	5 -	1435	9 -	1413
2 -	1892	6 -	1183	10 -	2205
3 -	6433	7 -	3734		
4 ABCDEFGHIJK	2042	8 -	1671		

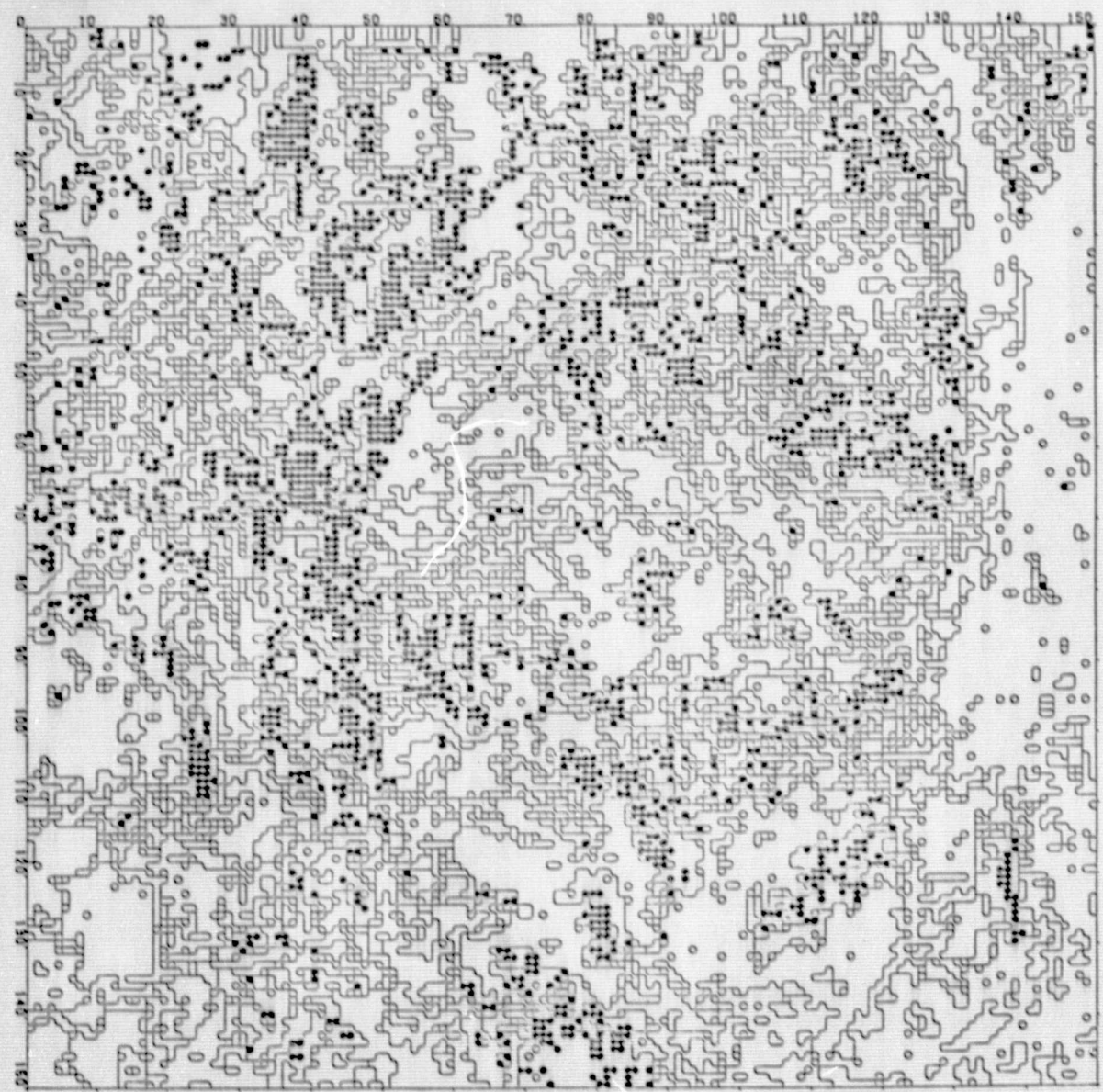


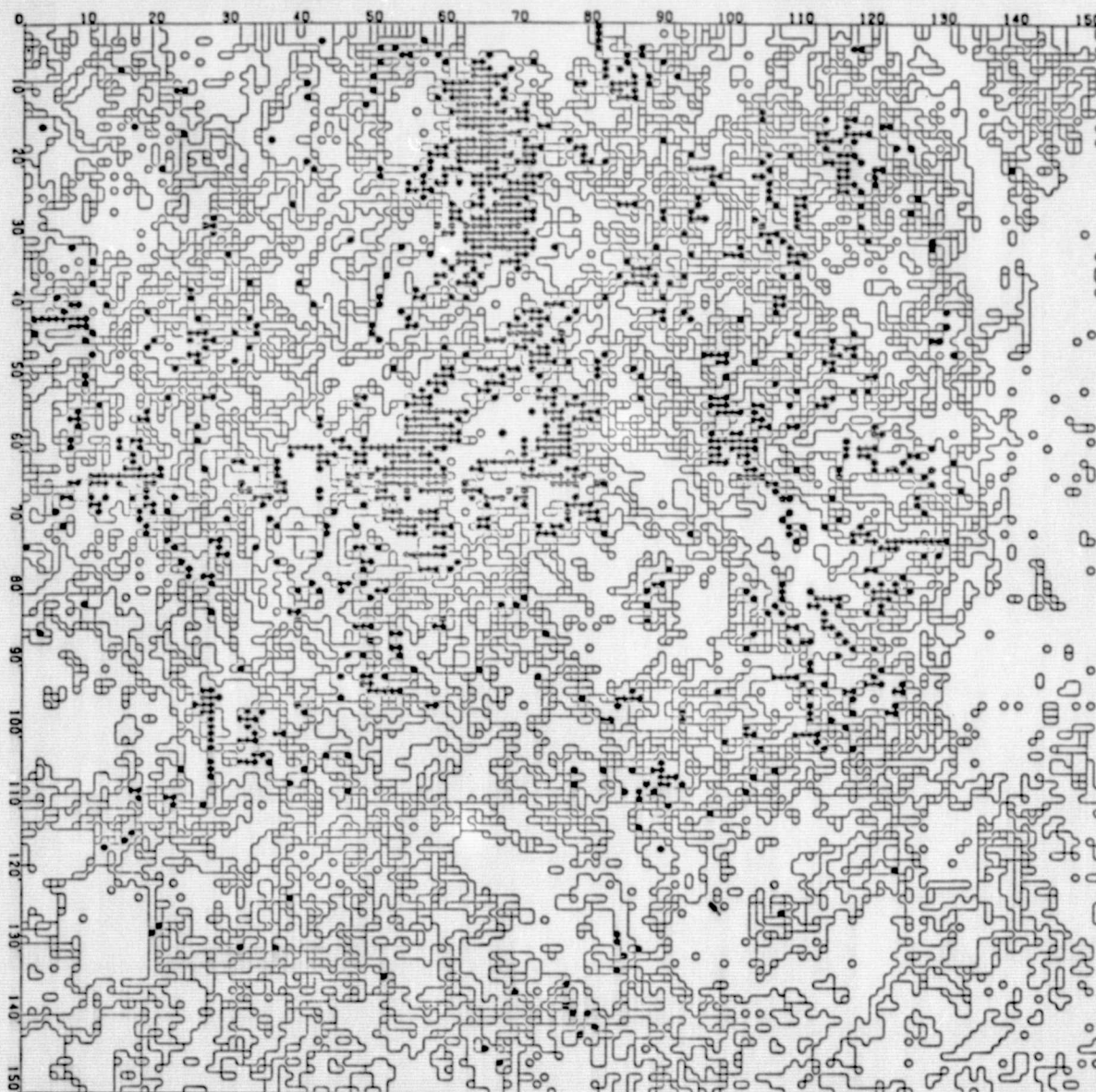
Figure 126

The Lady Annie Area. Computer generated map showing class 4 of the supervised classification into ten groups of the spectral signatures on the colour composite generated from MSS bands 4, 5 and 7 of grid section 23 of the Lady Annie-Mammoth frame. LANDSAT 2: ID 2059-00012: 22 March 1975.

ERTS FRAME 11A

10 GROUPS-SOUPED NO BIN 31/10/77 FROM TSI -ERTS FRAME 11A LADY ANNIE ARE

GP SHADING	POINTS	GP SHADING	POINTS	GP SHADING	POINTS
1 -	492	5 ABCDEFGHIJK	1435	9 -	1413
2 -	1892	6 -	1183	10 -	2205
3 -	6433	7 -	3734		
4 -	2042	8 -	1671		



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Figure 127. The Lady Annie Area. Computer generated map showing class 5 of the supervised classification into ten groups of the spectral signatures on the colour composite generated from MSS bands 4, 5 and 7 of grid section 23 of the Lady Annie-Mammoth frame. LANDSAT 2: ID 2059-00012: 22 March 1975.

ERTS FRAME 11A

10 GROUPS-SOUPED NO BIN 31/10/77 FROM TSI -ERTS FRAME 11A LADY ANNIE ARE

GP SHADING	POINTS	GP SHADING	POINTS	GP SHADING	POINTS
1 -	492	5 -	1435	9 -	1413
2 -	1892	6 ABCDEFGHIJK	1183	10 -	2205
3 -	5433	7 -	3734		
4 -	2042	8 -	1671		

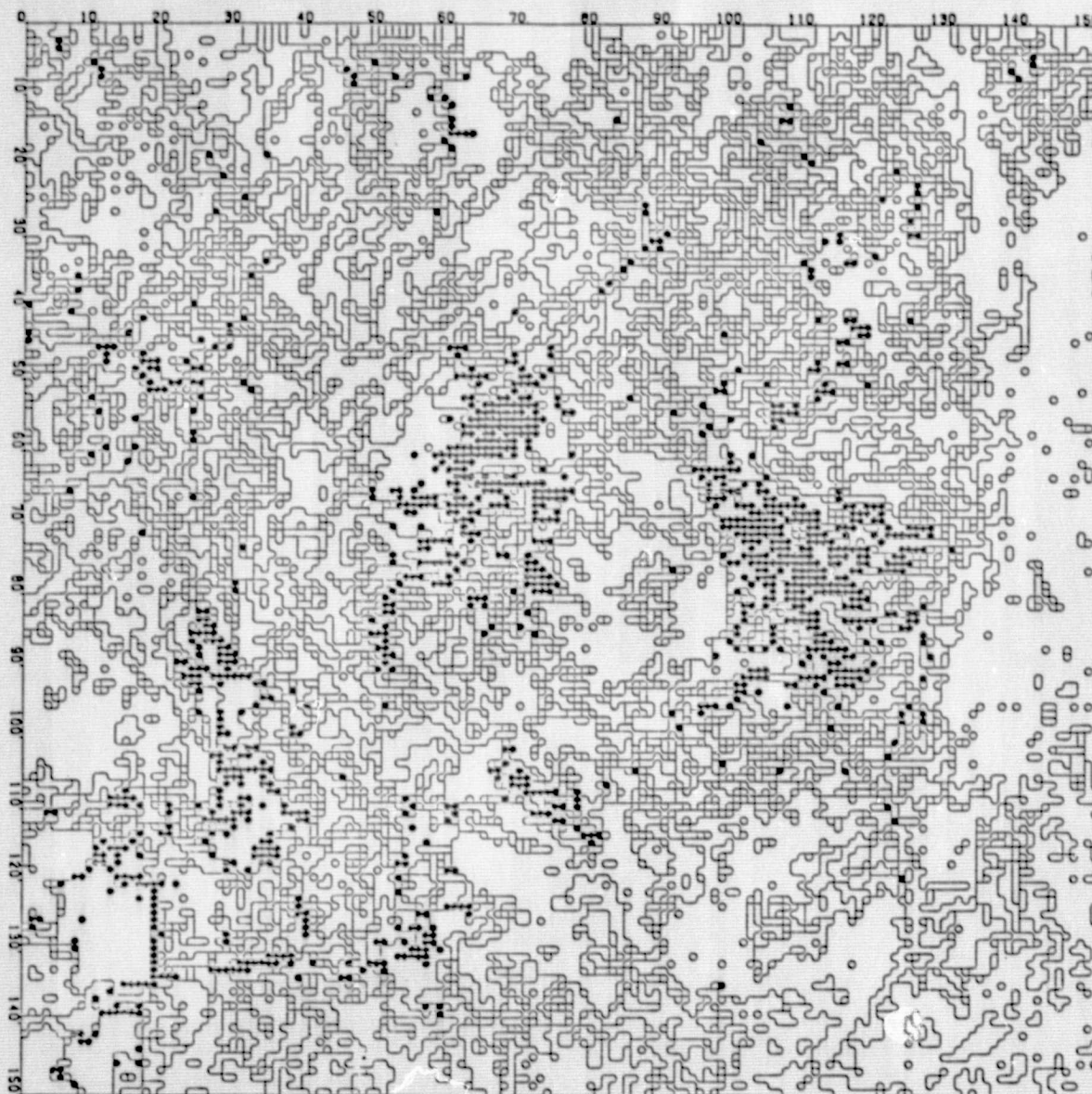


Figure 128

The Lady Annie. Computer generated map showing class 6 of the supervised classification into ten groups of the spectral signatures on the colour composite generated from MSS bands 4, 5 and 7 of grid section 23 of the Lady Annie-Mammoth frame. LANDSAT 2: ID 2059-00012: 22 March 1975.

ERTS FRAME 11A

10 GROUPS-SOUPED NO BIN 31/10/77 FROM TSI -ERTS FRAME 11A LADY ANNIE ARE

Q#	SHRDLG	POINTS	Q#	SHRDLG	POINTS	Q#	SHRDLG	POINTS
1	-	492	5	-	1435	9	-	1413
2	-	1892	6	-	1183	10	-	2205
3	-	6453	7	ABCDFFGHJK	3734			
4	-	2042	8	-	1671			

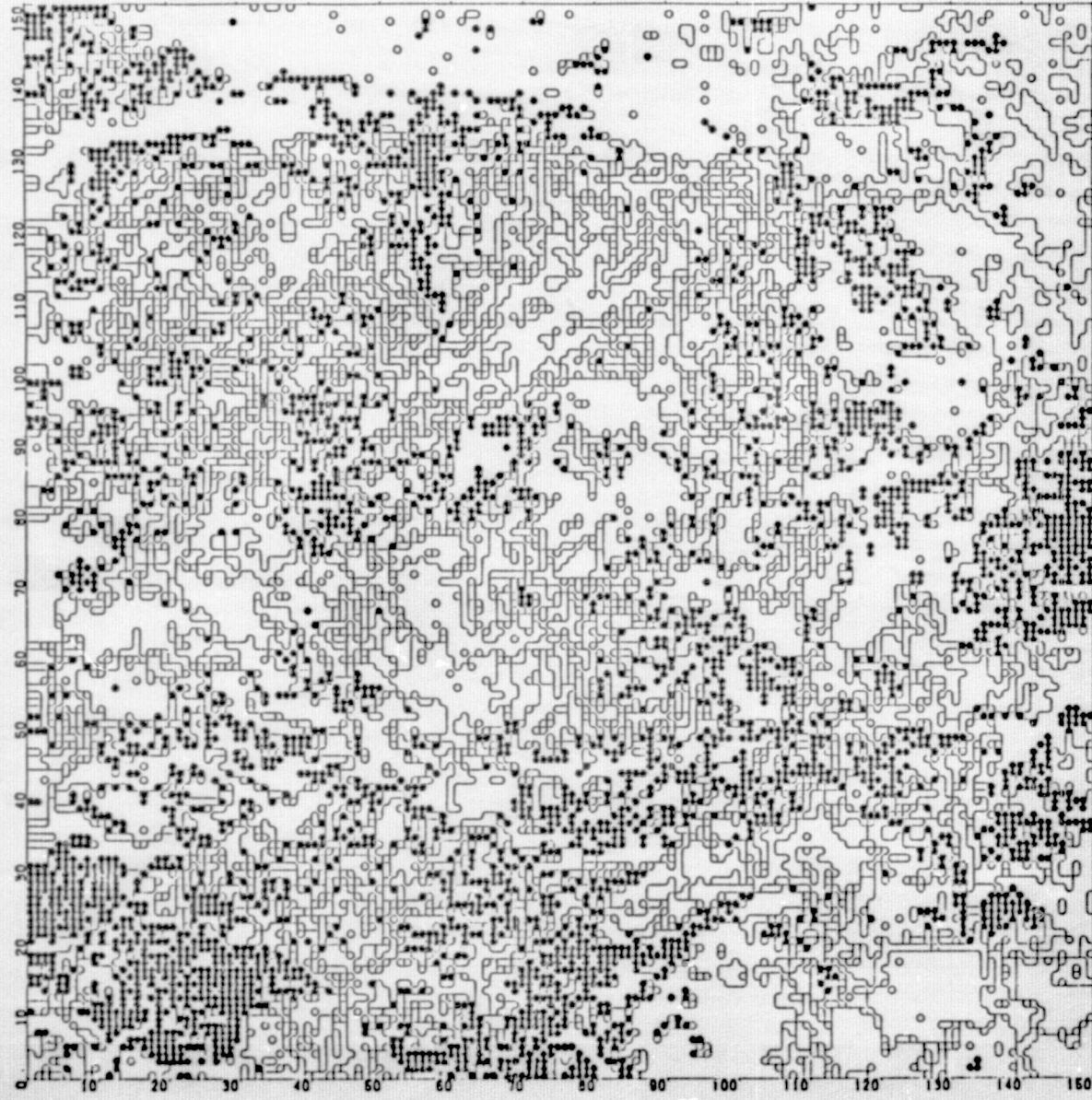


Figure 129

The Lady Annie Area. Computer generated map showing class 7 of the supervised classification into ten groups of the spectral signatures on the colour composite generated from MSS bands 4, 5 and 7 of grid section 23 of the Lady Annie-Mammoth frame. LANDSAT 2: ID 2059-00012: 22 March 1975.

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ERTS FRAME 11A

10 GROUPS-SOUPED NO BIN 31/10/77 FROM TSI -ERTS FRAME 11A LADY ANNIE ARE

GP SHADING	POINTS	GP SHADING	POINTS	GP SHADING	POINTS
1 -	492	5 -	1435	9 -	1413
2 -	1892	6 -	1183	10 -	2205
3 -	6433	7 -	3734		
4 -	2042	8 ABCDEFGHIJK	1671		

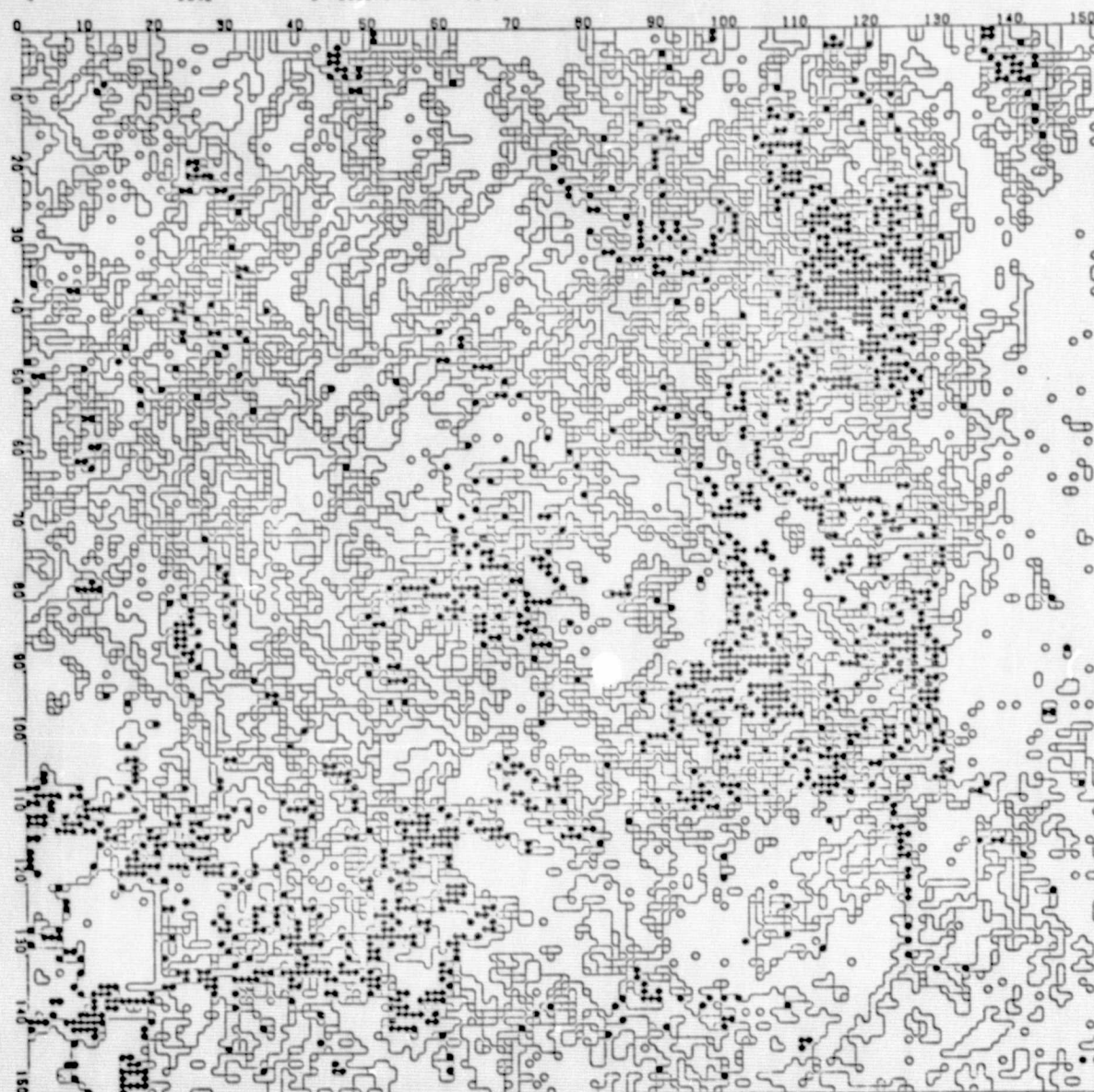


Figure 130

The Lady Annie Area. Computer generated map showing class 8 of the supervised classification into ten groups of the spectral signatures on the colour composite generated from MSS bands 4, 5 and 7 of grid section 23 of the Lady Annie-Mammoth frame. LANDSAT 2: ID 2059-00012: 22 March 1975.

ERTS FRAME 11A

10 GROUPS-SOUPED NO BIN 31/10/77 FROM TSI -ERTS FRAME 11A LADY ANNIE ARE

GP SHADING	POINTS	GP SHADING	POINTS	GP SHADING	POINTS
1 -	492	5 -	1435	9 ABCDEFGHIJK	1413
2 -	1892	6 -	1183	10 -	2205
3 -	6433	7 -	3734		
4 -	2042	8 -	1671		

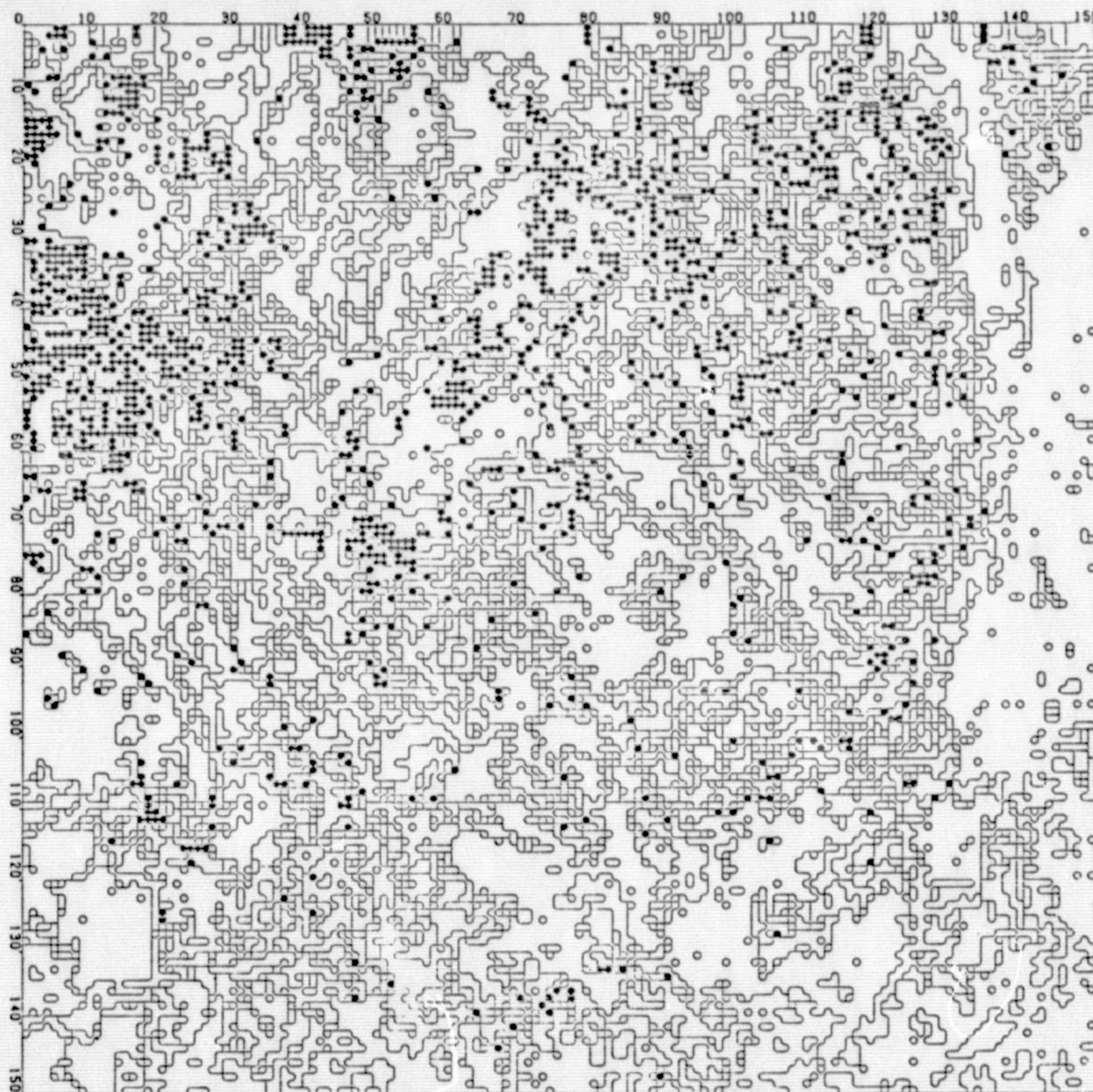


Figure 131

The Lady Annie Area. Computer generated map showing class 9 of the supervised classification into ten groups of the spectral signatures on the colour composite generated from MSS bands 4, 5 and 7 of grid section 23 of the Lady Annie-Mammoth frame. LANDSAT 2 : ID 2059-00012: 22 March 1975.

ERTS FRAME 11A

10 GROUPS-SOUPED NO BIN 31/10/77 FROM TSI -ERTS FRAME 11A LADY ANNIE ARE

GP SHADING	POINTS	GP SHADING	POINTS	GP SHADING	POINTS
1 -	492	5 -	1435	9 -	1413
2 -	1892	6 -	1183	10 ABCDEFGHIJK	2205
3 -	6433	7 -	3734		
4 -	2042	8 -	1671		

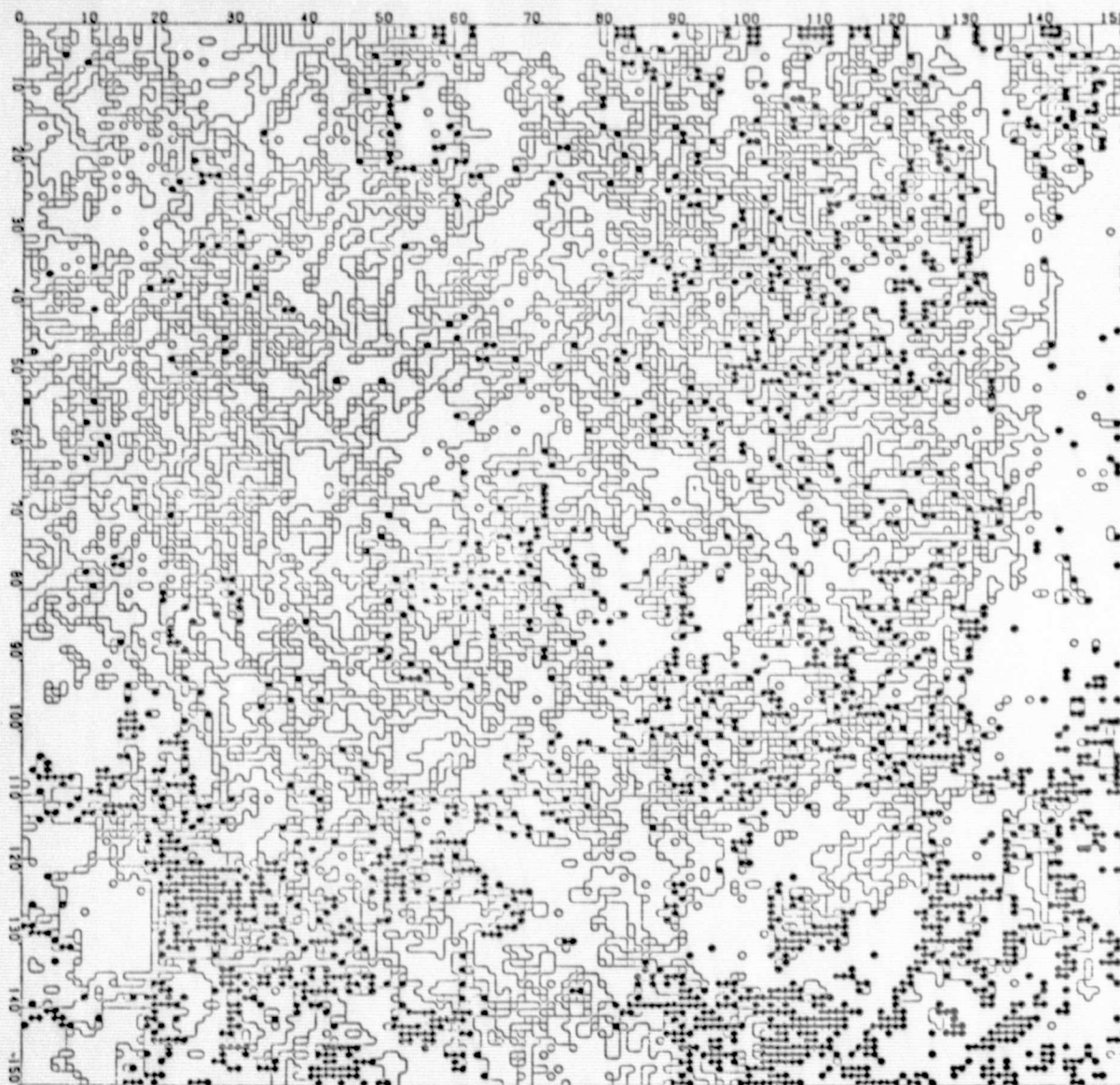


Figure 132

The Lady Annie Area. Computer generated map showing class 10 of the supervised classification into ten groups of the spectral signatures on the colour composite generated from MSS bands 4, 5 and 7 of grid section 23 of the Lady Annie-Mammoth frame. LANDSAT 2: ID 2059-00012: 22 March 1975.